Annual REPORT

OF THE

Department of Mines

NOVA SCOTIA,

FOR THE YEAR 1875.

HALIFAX, N. S.

PRINTED BY THE CITIZEN PUBLISHING COMPANY.

1876.

CONTENTS.

ERRATA.

PAGE.

3 Line 1. Insert 'that' to read—'that that due care.'

16 " last. Strike out 'and,' and read—'used, have been thus generally noticed and dwelt on because "it is" believed.

20 " 4. Read 'vacuum produced.'

30 " 18. *For* 'stock' *read* 'slack.'

31 Transfer to the end of the first paragraph, the last sentence of the second paragraph beginning "The drill was then taken" &c.,

LETTER

FROM

THE COMMISSIONER OF PUBLIC WORKS AND MINES,

TRANSMITTING

A Report of the Department of Mines.

DEPARTMENT OF MINES,

Halifax, February 3rd, 1876.

SIR,

I beg to submit herewith for the information of His Honor the Lieutenant Governor, the Report of the Inspector of Mines for the present year, giving statistical and other information usual in such report.

I have the honor to be,

Sir,

Your most obe'dt Servant,

ROBERT ROBERTSON,

Commissioner of Public Works & Mines.

HON. P. C. HILL,

Provincial Secretary.

REPORT

ON THE

INSPECTION OF MINES

IN

NOVA SCOTIA,

For the Year ended 31st December, 1875,—By HENRY S. POOLE, F,G.S.

ASSOCIATE OF THE ROYAL SCHOOL OF MINES, &c.

HALIFAX, February, 1876.

SIR,—In accordance with the established custom of submitting an annual report on the condition of the mining industries of this Province, I beg to submit the following for the year 1875.

In doing so I have to state that the sanguine expectations of three years ago have not been realized, and that, instead of the active prosperity anticipated for the coal trade, this principal mining industry has suffered a serious decline. Many companies having been compelled during the past year to almost entirely close their collieries, with the consequent result, the distress now prevalent among the mining population of Cape Breton.

The continued depression in mining is clearly observable in the following comparative General Summary, which, I may add, contains information in several of the entries, for which I am indebted to the assistance of gentlemen of the Customs Department.

Comparative General Statement.

Mines 1875.	Minerals.		Quantities. 1873	1874	1875	Values. 1873	1874	1875
31	Coal	tons.	1,051,467	872,720	781,165	2,699,347	1,787,098	1,434,062
41	Gold	ozs.*	11,852	9,141	11,208	219,270	164,538	201,756
1	Iron ore	tons.	3,485	2,469	4,467	10,455	7,407	13,401
	Plaster	"	120,693	104,140	95,159	120,693	104,140	95,907
	Freestone, &c	"	2,820	8,829	5,778	34.532	40.313	39,639
	Limestone	"		448	4,860		537	3,372
	Moulding Sand	"	130	300	100	260	600	200
	Barytes	"		208	175		2,680	1,750

*Unsmelted Gold valued at $18 per ounce.

Gold Mining alone, it will be noticed, shows a slight improvement. The first rally that has taken place since 1870, and the second since the decline in the production began in 1867, when the yield was 27,583 ounces. The advance of more than 2000 ounces, which it shows over the yield of the previous year, although small, is satisfactory, for it holds out hopes that with careful management there may yet be a revival of this which once promised to be an important industry. It is also gratifying to know, that the principal miners are of opinion that the current year will show a further increase.

Equally with coal the industries of secondary importance, plaster and freestone, felt the season of depresion. In the General Summary the lessened exportations of building stone are not shown, as the increase of the trade in grindstones on the Joggins shore makes up the deficiency. These industries will be again mentioned further on in this report.

Before reverting to the principal one, the coal industry, it may be remarked that neither has the past year been one of much advance and improvement in practice, or in the adoption of new inventions. Since a time for close economy and even for make-shifts as it has been, is not one for experimentalizing or making alterations that entail much expenditure. In former reports, the references made on matters of practice elsewhere of interest, and on the general prospects of the several industries were received as it was hoped they would be, and with no disfavor. I again venture to insert some comments on subjects that appear to me to be of sufficient general interest for insertion; and, although a report should be strictly retrospective, make this also to some slight extent prospective.

But first I would refer to a matter, upon a right understanding of which hinges much of the effectiveness of the

Mines Regulation Chapter that due care of life and property be taken, which it is the object of the act to inculcate. I will style it:

The Inspector's Responibsility.—At the inquest held at Montagu in February, referred to in my report of last March, and subsequently shown before the courts to be illegally constituted, the coroner instructed his jury to find the Inspector negligent for not "ordering the necessary precautions to be taken to prevent accidents not only in this mine but others, particularly in mines that have been worked for a number of years." This incorrect ruling expresses a very general impression existing among many, even of those directly interested in mining, and who should be at least to some extent familiar with the mining law. On this account a few remarks on the matter may not be out of place.

Mining is a business which always will be attended by some danger. Rules and regulations, although they may do much, cannot secure perfect safety. Constant care and watchfulness coupled with good discipline are the only safeguards. The new mining law incorporated in the Fourth series of the Revised Statutes, and enacted in the interest of the lives of working men, recognizes this when it makes the owners, agents, and managers, responsible for the carrying out of the General Rules and Regulations. It not only makes them responsible on direct proof of negligence, but presupposes every contravention to be due to their negligence and so throws the burden of proof of innocence on them.

It states:—"And in the event of any contravention of or non-compliance with any of the said General Rules in the case of any mine, *by any person whomsoever*, the owner, agent and manager, shall each be guilty of an offence against this Chapter, unless he prove that he had taken all reasonable means, by publishing and to the best of his power enforcing the said rules as regulations for the working of the mine, to prevent such contravention or non-compliance."

The Chapter then gives certain discretionary powers to the inspector, stating that he may do any of the thing enumerated in section 20. But the Legislature, recognizing their inability to secure the services of a mortal who was Argus-eyed and who could be ubiquitous, did not require him to guarantee from time to time the safe condition of any mine. They wisely placed the responsibility of

managing the mines solely and altogether on the owner, agent and manager. The law further defines the "manager" to be the chief officer, having the *daily supervision* of the underground workings; and no-where states or even implies that an inspectoral visit guarantees the perfectly satisfactory condition of any mine, or that an official visit can be pleaded as an excuse in the event of an accident resulting from non-compliance with the law; recognizing that an occasional visitor can only judge of the general practice, and that the work of detail must necessarily be left to those in daily charge. And that they may be reminded of their duty respecting the law, it is required that an abstract of it be kept constantly posted in a conspicuous place, where it may also be seen by workmen, in order that any of them may, should they think that the ordinances enacted for their safety are neglected, complain to the Inspector, whose duty it would then be to investigate the complaint.

While the General Rules go as far as it is at present thought advisable to legislate on the general practice, the law also sanctions the making of special rules which are to have the same force as the general rules at any mine where it is found desirable to have them; still, much must be left to the individual discretion of managers who have the time and opportunity to study the specific requirements of each mine. The giving of minute instructions, that are to be implicitly obeyed, is seldom to be commended, since they may so hamper a manager as to destroy that individuality of character upon which a reputation for good or bad mining must depend; and by removing much of the responsibility, take away much of the incentive to close attention.

A confirmation of this view of the manager's responsibility is furnished by the enactment of the section in the mining law of Great Britain, which requires all managers of non-metalliferous mines to now hold certificates of competency. An excellent law. For through it in time a body of men will be secured, better trained as a class than heretofore, to manage extended workings, and to have that essentially necessary care for the lives of the hundreds ot men often placed under their individual control.

Official interference beyond that which is defined by the strict letter of the law, it is at present thought should be exercised with caution. And although there is the clause which permits (on arbitration) an Inspector, in particular cases, to use his own judgment, it yet says he "may," but

does not say he "shall" interfere. When what seems a particular case does arise, great care should be taken to see that the exigencies of the case really require further interference, and that no prejudicial favor for any plan or system or modern improvement dictates the step For instance, a recommendation which would necessitate a careful supervision over many details, which supervision could not be given by an inspector in this Province where the operations are so widely scattered, and at some seasons so difficult of access. Such a recommendation should be made with caution, lest the inspector become a sharer in the responsibility. Then in matters of such moment as to greatly effect the expense of working and the question of successful competition between rival mines, hesitation is undoubtedly expedient. Hitherto I have thought myself justified in not acting under this clause so long as I have been in doubt, and no clear way for remedy presented itself. I have in one or two cases ventured to suggest alterations, but there are questions of practice, of grave moment, of which I have doubts and of which the law has in part treated, but only so far as our present experience seems to warrant. Among these which I believe have to be yet grappled with are the questions: the compulsory use of safety lamps, and the use of powder in fiery mines. Where gas is given off from a coal, it cannot be denied there always will be a possibility of ignition by the use of powder; and in such mines where there is an occasional liability to cut feeders of gas, there must be a constant fear of serious results, fire and explosions, with loss of life and property. In such cases it cannot be questioned that it would be safer not to use powder at all, but who is to decide between safety and expediency? who is to say whose mine shall be worked and whose mine shall not be worked? for in these days of close competition the question would resolve itself into this.

Again, in every pit where gas is ever found, it would doubtless be safer always to use safety lamps, if only the same precautions would be taken with them as with naked lights. But unfortunately it is not so. Good authorities are of opinion it is better to have it felt that the use of naked lights requires good ventilation and good management, than that the use of lamps should give a false sense of security, and induce carelessness. Even in England where mining law has been for a long time studied, these questions have been no more definitely determined, and the law does not say which class of mine shall, and which may not invariably use safety lamps. The circumstances of

individual cases may necessitate the use of lamps but a legal discrimination would be difficult and oftentimes invidious.

In the exercise of my duty I have endeavored to bear in mind, that the main object of the enactment of the law was the protection of life; and not so much to punish bad mining as to ensure better mining in the future. I therefore venture to consider I carry out the spirit of the law, when I point out any noticed neglect and give time for the necessary compliance, without appealing to the magistrates for the infliction of a fine. There is, however, a time when forbearance becomes a weakness, but until I find an endeavor is made to take advantage of this clemency, and one warning remains unnoticed, I shall continue to ask for your sanction to this practice. Yet it has to be borne in mind that many of those engaged in mining have not had much or any experience outside the field in which they have been brought up, and often little in that, consequently they have not the training which general observation gives to fit them to prepare for all the difficulties that grow with the extension of their workings, and some allowances must be made for them. Nor is it easy to awaken men from that false sense of security which a freedom from accident engenders, or to arouse an interest in the carrying out of the law in those who cannot of themselves realize the need in their individual cases for its enactment.

THE COAL TRADE.—The reduction of ten per cent., which the tables show the trade of Cape Breton to have suffered beyond that of the previous year, would not of itself have been sufficient to occasion the present distress among the mining population of that county, had it not been that the great decline of the previous season followed a year of active trade, which had induced additional men to settle about the collieries, and had given color to the impression that new pits could, with profit, compete in the trade with those already established. Then the winter of 74-75 drew so heavily on the personal credit of the miners, that they were unable to restore it during the past season, one which they were unwilling to believe would prove as dull as the preceding; but it was more so, and consequently the local traders were unable again to make advances, and furnish supplies for the present winter.

The total sales for the year were 706,795 tons, a decline of 42,332 tons from those of the previous year; and less by 174,311 tons than those of the year before that, when the trade was more prosperous than it has ever been. The de-

cline was chiefly in the trade with the United States and West Indies, which fell off 48,000 and 31,000 tons, from a business of 138,000 and 47,000 tons, respectively. A small decline of 2,000 tons took place in the Home Consumption. These losses in trade were in part balanced by the increased shipments, of 27,000 tons to Quebec, 7,000 tons to New Brunswick, 7,000 to Newfoundland and 2,000 tons to Prince Edward Island. The county of Cape Breton sold 32,000 tons, and Pictou 21,000 tons less than the year before, while the sales from Cumberland were 11,000 tons in excess of those of 1874. These figures are given in round numbers.

The cause of the decline in the trade with the United States will be especially mentioned further on, and some reasons suggested why it has been produced. While the retained duty of 75 cents in gold is an undoubtedly good reason for the reduction of that branch, a similar excuse cannot be pleaded for the loss of the West Indian trade. A reference was made to this matter in the last report, and the competition due to the low freights current from England and Baltimore shown. To encourage this branch, which should be one of the most important of the export trade, is a matter for the consideration of our own merchants. And while they have to deliberate how manufactures at home may be developed so as to occasion full return cargoes and so reduce the rates of outward freight, the coal producer should not forget that in the preparation of his raw product for the markets abroad he has still left him much room for improvement. That coal be shipped large and dry is essential to the good condition of a cargo on arrival after a long voyage. The dropping it down 20 or 30 feet into vessels, shipping it in all weathers, and frequent shovellings are not conducive to the good quality of ordinary coal. The deterioration of small and wet coal from heating in the confinement of a heap or in a semi-closed vessel is very much greater than is generally imagined by miners and shippers. Gas manufacturers, however, know it to their cost, and under the heading "The Spontaneous Combustion of Coal" brief reference is made the subject.

Of the coal seaborne 201,857 tons were taken by 480 steamships, but as this number includes the steamers that called at the coal ports for bunker coal the average size of the cargoes does not appear. 420,741 tons were carried by 2,832 sailing vessels, which on an average took but 148 tons ; a small average, and one that shows that the class of vessels engaged in the trade was smaller than usual.

It will be noticed that no material difference took place in the Home Consumption of coal during the last three years, and instead of that increase naturally to be expected, there has been an actual, though small, decline. The difference has been somewhat more than made up by the importations of Anthracite. The Maritime Provinces imported 20.520 tons of Anthracite in 1874-5 from the United States, for use in furnaces and hall stoves.

The decline in the home consumption of native coal is much to be regretted, for no branch of the trade is so important as this, for by it the growth of native manufactures may be gauged. An increase is to be anticipated for the present year, as the Steel Company of Canada will require large quantities of coal in the form of coke on the blowing in of their blast furnaces, which is expected to take place in the course of the summer. If the expectations of that company are realized and their works are established on the scale contemplated they will alone consume some 100,000 tons of coal a year. The impetus which such an industry would give to the country is one which it is desirable to speak of as effected rather than as contemplated.

There is one feature of the general trade which as it shows a healthy condition is well worthy of more than passing attention, it is the trade with the neighboring Provinces. Even in competition with free American coal it has more than doubled within the last four years.

Coal sold to neighboring Provinces:

1871	168,577	tons.
1872	285,433	"
1873	337,993	"
1674	338,754	"
1875	381,711	"

	NOVA SCOTIA SOLD		CANADA IMPORTED FROM	
	At Home.	To other B. N. A. Provinces.	United States.	Great Britain.
1871	150,232	168,577	216,633	190,680
" 2	199,886	285,433	....	177,904
" 3	215,295	337,983	428,455	131,338
" 4	214,965	338,754	671,224	186,753
1875	212,630	381,711	512,835	....

A comparison of the statement of the numbers of persons employed at the collieries during the last two years, clearly

shows how hard the times have been for the workmen engaged at the business of coal mining. On an average coal was drawn from the pits only on 136 days out of the 300 working days in the year, or on less than half. The total number of persons employed was less by 505 than during the previous year; and the total number of days labor performed was less by 175,839, which represents a reduction of almost $200,000 in the money expended for labor alone. The men who did get work, were employed on an average only four days in the week; that is, when an average is taken of the whole country. But as the decrease in business fell most heavily on Cape Breton, the workmen there consequently suffered more than in either Cumberland or Pictou Counties.

The Coal Trade with the United States has been even smaller than was anticipated a year ago, when it was stated that probably not more than 80,000 tons would be sold for gas making in that country in 1875. The quantity actually exported for that purpose was under 50,000 tons, as is shown in one of the appended tables, which, so far as can be ascertained, contains all the details of that branch of the trade.

Last year an account was given of this trade and its prospects, for which much indebtedness was due to the well known coal agents Messrs. Perkins and Job, of Boston and New York. Mr. Perkins of that firm has this year had the kindness to give further information and particulars, regarding the trade of the past year, which enabled me to write with more confidence on the subject.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.				CANADA
Years.	Quantities.	Duty.	Authority.	imported from the United States.
1865	465,194	Free.	United States.	
" 6	404,252	$1.25	Custom House.	
" 7	338,492	"	Reports.	
" 8	228,132	"	"	
" 9	257,485	"	"	
1870	168,180	"	"	216,633
" 1	165,431	"	"	
" 2	154,094	.75	"	428,455
" 3	264.760	"	Nova Scotia Dept. of	
" 4	138,335	"	Mines Reports.	671,124
1875	89,746	"	"	512,835

Of the quantity 89,746 tons exported in 1875, 828 tons were shipped from Cumberland county for steam purposes, 31,620 tons from Pictou for steam and iron purposes and 57,298 tons from Cape Breton; about 49,000 out of a total of 57,298 tons for gas manufacture. Of the Pictou exportations 16,962 tons went to Portland for the Grand Trunk Railway, 11,626 tons to Boston, Pembroke and New York for iron manufacture, and 3,032 tons to various New England ports for steam purposes. Until lately Pictou shipped large quantities to Boston for gas manufacture, but now that trade has entirely ceased and in all probability will never revive, being beyond the control of the shippers. It also entered largely into New England for purposes connected with iron making, for which it is well adapted. But it has lately had to compete with Cumberland coal from Maryland which is somewhat preferred. The average cost of the latter at Boston during the past year was $5.75 per ton, and Pictou $5.40 Am. Cy The difference in price not being sufficient to induce manufacturers to use it in preference to their own coals. So far as can be ascertained from the Customs Returns

THE GAS COALS EXPORTED WERE SENT FROM THE FOLLOWING CAPE BRETON PORTS.

Ports.		To New York.	To New England.	
Cow Bay,	about	10,899 tons.	458 tons.	
Sydney,	"	11,172	870	
Caledonia,	"	445	7,584	
Glace Bay,	"	1,941	914	
Lingan,	"	760	13,786	
Total		25,217	23,612	48,829

In last year's report, page 3, the trade of this class of coal and the causes which led to its decrease were entered into at some length. Another year's experience has only confirmed the unfavorable view then taken of the prospects. And the reasons may be thus briefly summarized:

American gas coals are preferred, when they come into competition with Nova Scotia gas coals;

1. For their quality, and for the lower average per centage of sulphur they contain;

2. For their position relative to the markets of New York and New England;

3. For the increased facilities which new railway connections enable regular deliveries of fresh mined coal to be made during the entire year.

Although the trade has declined to the extent shown above, there is yet no immediate fear of losing entirely this branch, for gas producers are still of opinion advantages are derived from an admixture of our coals with those of the United States. Of the quantity 850,000 tons annually consumed in New York and New England, perhaps one-tenth would be of Provincial coal were competition permitted.

Before proceeding to treat of the trade of the past year, I desire to call attention to the statement that our coals contain much sulphur. That they contain more than the best American gas coals, cannot, I fear, be questioned, but for the high per centage imputed to them by Professor Chandler I can find no other authority. Addressing the Gas Light Association at New York, October 20th, 1875, he stated that "Nova Scotia gas coals (Glace Bay, Lingan, International, &c.,) contain from three to five per cent. of sulphur." Such a statement made by such an authority as Professor Chandler, is apt to depreciate the value of the coals mentioned. That it was made with the intention of injuring our coals is not probable. More likely it was a hap-hazard conjecture intended merely to show that, in his opinion, they were of such a nature as not to be worth treating with accuracy. I have appended a table of analyses, in which will be found no such per centage as 5 or 4, or as high an average as 2.3 per cent. One analysis certainly does show a higher per centage, but the sample (?) of the Block House coal, of which it was made, was "taken without selection from the coal as it came to bank, and may be assumed only in a general way to represent the average quality," so Mr. Robb states in a foot note to his report, from which it is taken; in other words it was a hand specimen, and therefore not an average sample of the seam. As the Block-house is known to be one of our best gas coals, the per centage stated is evidently not an average one.

The supplies of gas coal in the States in the spring of last year were very large, owing, it is stated, to the excessive importations of the previous year, and the falling off in the consumption of gas, which was due to the general depression in business during the winter of 1874–5.

It was fully expected that the prices of all coals would rule lower for 1875 than for the previous years, but the great decline that eventually took place was not anticipated. The

price paid at New York in 1874, which was a reduction of 75 cents for that of 1873, was $7.50. Then the sharp competition between the different American coal companies resulted in a still further reduction, and in the making of contracts for 1875, for their best gas coals at $6 50, a price that was maintained throughout the year. This rate it was early apparent would have an adverse effect on the trade of Provincial coal, and although our actual shipments have been small, they are quite as large as was expected in the face of such competition.

Mr. Perkins estimates that the cost of getting the American coals to market at the price named, $6.50, would leave to the companies only about $1.25, Am. Cy. per ton of 2240 lbs, for the coal screened on the cars at the collieries; a price that would certainly not be considered remunerative at any of our collieries.

Some small orders were taken for Cape Breton coal early in the season on the basis of $1.75 gold f. o. b., and the cost to the purchasers of these shipments may be estimated as follows:

Coal at Shipping Port	$1.75.
Duty	.75.
Gold Premium, Insurance, &c.,	.50.
Maximum Freight paid during the year	2.00.
Cost in Am. Cy. delivered at New York	$5 00.

Less by some 68 cents than the average cost at New York in 1874. Had the demand been as large as in former years freight could not possibly have been secured at the low rate given above. Some 12,000 tons were delivered at New York on early orders. Later in the season some further sales were made at $4.50 Am. Cy., delivered, and about 12,000 tons more were shipped at that price, which would make the average cost for the year, $4.75, or 93 cents Am. Cy., less than the price of American coal for 1875.

The result of these later sales to the coal companies may be thus stated.

Price at New York in Am. Cy.		$4.50.
Deduct Freight in Am. Cy	$1.75.	
" Duty, Insurance, &c.	1.00.	2.75.
Am. Cy.		$1.75.

The value f. o. b., at the Shipping Port in Cape Breton, or 50 cents more per ton than the American coal companies realized for their coal at their collieries.

At the end of last year the gas companies of New York and New England held large stocks of coal, and sufficient to supply most of them until July, and some of them for a still larger period. They have been induced to lay in large stocks on account of the low price of the standard American gas coals, under the expectation that the decline was temporary and that higher prices might be demanded in 1876; a fear that we now know there is no prospect of being realized. Then the falling off in the consumption of gas in many localities, incident to the continued depression at the factories, and a general desire to economize in all departments where gas is required, and the ability of gas companies to obtain a larger yield of gas per ton of coal than formerly, which has arisen from the use of better coals and naphtha, and of improved machinery connected with the distillation of gas from the coals now in use.

Remembering the increased competition among the miners of American gas coals, the increased facilities they now have for putting their products into the markets on the Atlantic coast, and the prohibitory duty of seventy-five cents in gold, an increase of any moment in this branch of our export trade is not possible for the present year. When the United States imposed the duty on bituminous coal, the imports from Nova Scotia were more than double the exports to Canada, (see table page 9); now the exports have quadrupled and the imports decreased in an equal proportion. The knowledge of this change in the relative condition of the trade of the two countries should strengthen the hands of the free traders in the New England States, who desire the duty to be taken off; that as Ohio profits by the free admission into Ontario of her coal, they may benefit by an open competition between the producers of native and Provincial coals.

The latest advices from New York report that contracts for American gas coals have been made for the present year at $6 per ton of 2240 lbs, delivered at New York, and that contracts for 150,000 tons will likely be made at that price. This is 50 cents cheaper than the rate of 1875, cheaper by $1.50 than 1874, and $2.25 less than 1873. The likelihood of our sales to the United States during the current year exceeding those of 1875 is most improbable; and were it not that Cape Breton coals make a strong and good coke, and are liked on that account to mix with American gas coals;

none at all would find their way to New York with an adverse duty of 75 cents in gold. There is now a prospect that this duty may be taken off during the ensuing Session of Congress, but even if it be removed it is feared it will be, at a time too late to materially effect the trade with the New England States during the ensuing season.

Combination of Coal Owners.—In September last the representatives of most of the coal companies operating in the Province, met at Stellarton, and unanimously were of opinion that an association would be for their general welfare. They all agreed that it was impossible to continue their operations in the then state of the trade. They mutually complained that their collieries were kept open at a loss; that the prices obtainable for the coal were ruinously low ; in part owing, they acknowledged, to the competition among themselves for the trade of a limited market, but chiefly to the competition outside the Dominion.

At the meeting it was proposed to partially control the trade, if possible, by regulating the output, the prices and the rates of wages ; and further to use any political influence they, as a body, might acquire for the interest of their trade. With this latter part I have only to remark that colliery proprietors sometimes appear to forget that they acquired their leases from the Crown at a fixed and uniform royalty, and that they had not to pay out from their capital account a sum of money for the purchase, the interest of which is represented by the royalty. The former part of their proposition has much to commend it, and the arguments adduced are, I think, worthy of general consideration. Although there is always a danger that such a combination when thoroughly well managed is liable to lead to abuses, just as combinations of workmen which have been under the consideration of the Legislature and regulated by enactments, have been found injurious by raising the price of labor above that which legitimate trade competition, with other countries or districts, can afford ; so such an association by acquiring a monopoly may press hardly on the public for the advantage of the few. But as there are so many interests to consult, no association that would take the form of a monopoly could well be agreed to or carried out in the Province.

No one for a moment can doubt but that the present condition of the trade is most unsatisfactory. The exports having declined from 665,811 tons in 1873, to 533,162 tons tons in 1874, and 494,165 tons in 1875. While the home

consumption has remained about the same 215,295 tons, and 214,965 tons, and 212,630 tons in the three respective years. The trade with the United States fell off from 465,194 tons in 1865, to 154,092 tons in 1872; reviving a little in the busy times of 1873 it amounted to 264,760 tons, declining in 1874 to 138,335 tons, and further in 1875 to the almost nominal quantity 89,746 tons. The adverse duty of 75 cents in gold practically prohibiting the importation of any quantity of Provincial coal into that country; and the royalty of 10 cents in this, makes the sum of 85 cents in favor of the native producer of bituminous coal competing in the New England States. Were the duty removed, one-half the sum would enable our mines to ship at a profit and save the other half to the consumer. In connection with this subject our miners complain that every facility is given to the importation of American coals and that the quantities of both anthracite and bituminous are annually increasing. The quantities are shown elsewhere in the extracts from the Custom House reports.

Among the expected advantages to be gained by a combination would be the employment of one sales agent in each market, instead of the many that are now engaged in selling the several coals, and in underbidding one another for the orders that may exist. The minimum price being fixed by the combination for each quality of coal he could sell to each customer, that quality more especially adapted to the particular requirements of each. At present there is always an endeavor on the part of each agent to force a market and sell even a coal not specially adapted, and as an inducement for a trial to be made at a low and unprofitable figure, with a result unsatisfactory to both buyer and seller. Besides the present competitive stand taken by the several operators gives a prejudicial advantage to purchasers of large quantities, who, by pitting one seller against another, are ultimately enabled to buy what they require at rates so low as not to pay even the current expenses.

One general sub-agent could make all the foreign contracts, arrange to deliver a definite quantity at stated times and as required, say 1000 tons a week, and be able to carry out his contract which no one colliery employing sailing vessels now can pretend to do. The association could also appoint one person to charter vessels and regulate the supply of tonnage for each shipping pier, doing the work much cheaper and better than it is now done. And in brisk

times when tonnage is scarce, there would be no port competition for the shipping at any place beyond the demand that the general trade may cause, while under the present system, competition often leads to the payment of exorbitant rates.

It has been often the case that a whole fleet of sailing vessels have been chartered at one time for one company. They sail and arrive together. Some are detained for weeks waiting for their turn and incur demurrage. Then, at times, many after loading are detained by contrary winds, and collecting, sail and arrive together at the port of discharge, consequently occasioning unnecessary expense for additional or temporary storage.

By the employment of steam-colliers, the supply can be regulated and contracts entered into with a certainty of knowing the results beforehand, while by the use of sailing vessels with their fluctuating rates of freight, no certainty can be relied on when making contracts.

Then again somewhat of the same reasoning would apply to the carriage of coal by railway, for one agent would have more weight in arranging the tariff, in regulating the daily supply to the road, and by commanding the handling of fifty or one thousand tons of freight, could obtain the most favorable terms for all customers and producers; while several agents, influenced by conflicting interests can be made to clash and wrangle over the supply of trucks and wagons provided by a railway.

A combination could also deal with the question of labor and arrange the rate of wagesand the allowances and offtakes, the house rent, the coal supply, &c., which now, not being uniform, cause discontent among those, doing similar work at the different establishments, whose allowances are not always equal. Nor would such a combination settling these matters be adverse to the interests of the workmen, who would get steadier employment and be better satisfied with their work if the business they were engaged in were profitable. The uniformity of allowances and rates would also tend to reduce the migratory habit of trying first one colliery and then another.

It is hardly expected, even by the most sanguine advocates of the scheme, that all the advantages enumerated as possible to result from an effective association are ever likely to be brought about, but the arguments that are used and have been, thus generally noticed and dwelt on because

believed much good would result from a united understanding such as a real combination would produce, and because the Province at large benefits by all that transpires for the real welfare of the mining industry.

Looking back at the history of previous mining operations, we see the want of much accord in the unnecessary expenditure of capital. The waste being dictated by a jealous spirit that hoped, yet without any ground for belief, to try by exclusion to prevent competition. We see it in the two railways, seven miles long, running side by side to the Middle River of Pictou, in the two branches from Westville to the main line at Stellarton three and a half miles long, in the two railways running together for ten miles from the outmines to Sydney Harbor, in the two artificial harbors at Glace Bay, and in the two breakwaters at Cow Bay. An unnecessary expenditure of at least a million and a quarter of dollars. The limits of the markets now open to our producers are well known, and it is also well known that the sales cannot be increased even by great reduction in the prices beyond the point at which mining can be done without loss, and yet the competitors for the trade that does exist underbid one another in the hopes that their aggregate sales may be sufficiently large to pay the current expenses even if there be no margin left to cover the wear and tear. In Pictou county this state of things is especially felt, and it is confidently expected that there some steps will be taken to remedy it. but it is doubted whether a thorough combination could be made among the miners of the three fields, Cumberland, Pictou, and Cape Breton, for so much undeveloped property is yet held in the former and latter. Then the formation of an association would give "Promoters" the excuse for foisting properties on the public as of great value since they were not in the hands of a ring of monopolists But in Pictou county where the field is limited, and the greater part of the available area held by five companies, the output could be the more easily controlled and apportioned off to each, according to a scale to be mutually agreed on. The minimum price and the maximum quantity being fixed under penalty to the association.

A thorough combination could also effect other advantages to Pictou County. There could ultimately be a reduction in the number of shipping piers, and in the staff employed: in the use of one line of railway where now two run side by side. Then a few hundred yards of track would put all in communication with the main line, and the cheapest ship-

ping point for each season could be selected and used by all. Further were a port open all the year round in use as Halifax, or a more easterly and nearer port as Whitehaven or Liscomb for the Pictou district, and Louisburg for Cape Breton, the regularity of delivery could be further ensured and additional traffic gained for the railway.

While it is unquestionable when combinations of capital and labor acquire much strength, and as monopolists are able to dictate terms and prices, that injury to the community results. It is also well known that the various guilds and trades have found it necessary for their self-protection to form boards or combinations and arrange prices of commodities. Competing freight and passenger transportation companies agree on a scale of prices, and the whole business is made profitable; though occasional misunderstandings may dictate a cut-throat policy in the hope that by some self-sacrifice a competitor may be ruined. At many centres of commerce boards of trade exist and fix the prices of the articles they manufacture or sell in each market. And the same may be said of workmen. On every side the coal-master sees associations for mutual protection and trade-unions raised for self-defence, and he naturally concludes that a similar association will also be for his advantage.

If for no other reason than the following I am persuaded that an association would be for the service of the industry. No marked improvement took place in England and abroad in the theory and practice of mining, until societies and institutes were formed, where those interested in the business could meet and discuss subjects of mutual utility; where modifications in ventilation, in the different systems of winning, in the machinery employed, and the various interests of the industry could be shown, criticized and condemned or praised as they seemed to deserve.

More than the rudiments of such an association now exist in Pictou County, but not in Cape Breton, where it is more generally thought there is less call for good discipline and high class mining than in Pictou. In time it is hoped this apathy will be removed, and a greater pride taken in displaying thorough and substantial workmanship, attended by economic results.

At the meetings of such an association, papers of practical value, such as I consider the following brief sketches outline, could be read; and such interest excited as to induce

the managers to make experimental trials and collect the necessary data that would show the absolute value of such interest.

Direct Acting Pumping Engines.—The use of these pumping engines in mines, has of late years, rapidly increased, since they commend themselves on account of their low first cost and the greater convenience they afford for extracting water from dip workings. In previous reports reference has been made to their introduction into this Province and to the conditions under which they have been successfully applied. Not only are they in use as subsidiary aids to the main pump, but in some cases as the only appliance for freeing the entire workings from water. The advisability of this proceeding is, in some cases, questionable as in the event of a sudden influx of water taking place where the standage is small, there would be a likelihood of the pumps being lost. But otherwise the only objections to them, are, the heat given off from the steam pipe, and the escape of the exhaust steam in the workings; both of which objections may be in part, or entirely, removed by coating the pipe with a non-conducting material and by turning the exhaust steam from the engine into the suction pipe of the pump.

There is also the objection, common to mostly all appliances, that they do not stand well continually pressed to their full capacity. In some cases much trouble has been met with, and several alterations have been tried before the pump would work satisfactorily with the exhaust steam turned into the suction. The experience acquired is worthy of note.

Where the quantity of water pumped is small and the column heavy, it has been found inexpedient to turn the exhaust into the suction close to the engine, but advisable to enter it into an enlarged section of the suction pipe cooled by the sump water for the exhausting is then more uniform and the water less heated. Where the water is much heated by the exhaust steam, the column of discharge pipes suffers from expansion, and the subsequent contraction on cooling when the pump stops; then joints leak, and the flanges are apt to be broken off by the strain. The introduction of the arrangement is not new, and the advantages of the system, and the reputed real saving of power are still sometimes questioned. Special modifications and arrangement of valves have elsewhere been patented, but here simple connections have alone been tried. When it has

been tried, it has been reported serviceable, and to possess the following advantages: First, that the exhaust steam is not only got rid of at a low cost, but with an actual saving of power in proportion to the amount of vacuum production in the pipe; Second, that the power of the pump is increased for a given steam pressure; and, Third, that the grease from the cylinders coats the suction and delivery pipes, and helps to resist the corroding influences of acidulated water. Mr. Rumble, the engineer for the Cape Breton Company, reports that they have four pumps thus fitted, two at the Reserve, and two at the Emery collieries. The effective saving, he states is, with a distance of 1400 feet between the boilers and the pumps, 10 lbs. of steam pressure, and an increase of speed from 30 strokes, when exhausting into the air to 37 strokes, when exhausting into the suction. Besides, he adds, the pumps work freer from thump and noise, than when exhausting into the atmosphere.

A short reference was made on page 11, of the report for 1874, to a similar arrangement at the Nova Scotia colliery, where a special pump forces water to a height of 560 feet. With an open exhaust the pump made 26 strokes per minute, and when exhausting into suction, the same pressure of steam increased the number of strokes to 32 per minute. The steam pump in the cage pit at the Albion Mines has been similarly altered, and it is reported to work with 4 lbs. less steam than before.

To save the expense of a heavy sinking set of pumps for the Gardiner pit, the shaft was put down by the aid of two of Cameron's special steam pumps, and although the feeder of water was large, no accident occurred. A pump of this kind was previously noticed as in use at the sinking of the Sterling pit at Glace Bay. The efficiency of this pump in skilled hands for shaft work was further proved by lowering the water in the Drummond workings filled to extinguish the fire.

Other modifications of pumping engines are constantly being introduced abroad, and many decided improvements have been made. Among them the adaptation of hydraulic engines for pumping from the deeps, the power being obtained from the main column of pumps, or by tapping the tubbing of the shaft. The draining of workings to the deep by means of rods connecting the pump with the main set, especially when the dip is slight, is not easy, and it is moreover expensive. Nor is it always wise or even possible to use a steam pump, while an hydraulic pumping engine may

be flooded and still go on working. Such an engine is placed at the bottom of the slope, a supply pipe is carried to it from the main column, or from the tubbing, and the delivery pipe from the pump is led to the main sump In which-ever way the supply of water to the engine is obtained, an equal amount of work is added to the main pumping engine. It has also been suggested that all the various underground work, for which engine power is employed, might be effected by hydraulic engines, thereby dispensing with all boilers and steam pipes in the pits; the main pumping engine necessarily being proportionately increased to the extra amount of work done by these engines. As an instance of one of the advantages these engines possess, the dip in which one of them was placed in a Clay Cross colliery was accidentally flooded, and the engine was under water two months, during the whole of which time it continued to work.

For the main set in place of the heavy and costly single Cornish or Bull engines, compound engines have in some cases been substituted. These although theoretically of no greater value and more complex than the single expansion engine have been practically proved, as marine engines, to be lighter, cheaper, and more economical. Ocean steamers instead of burning 5 to 6 pounds of coal per hour for each horse power with single cylinder engines, are now run with 2½ to 3 lbs. when driven by compound engines. Such engines, although twice as complicated as those with single cylinders have not been found any more liable than those of simpler construction to break down under the severe strains to which they are subject by the violent pitching and heavy rolling of a ship at sea.

At the collieries it is no uncommon thing for engines to consume as much as 16 lbs. per horse power per hour, and until late years, in England, when such coal as the collieries use for steam purposes became saleable, there was little inducement for the proprietors to look into the subject as they are now doing.

In Cornwall it was different, and for a long time great attention has been there paid to the economy of fuel. Thirty years ago engines were devised and worked with an eight and even ten-fold expansion. The latter giving the exceptional duty of 112 millions, while the average duty was 67 millions. But of late years the records show a falling off to an average duty of 48 millions, partly due, it is thought, to the absence of competition, and partly because it was found

on the whole more economical to work with only a three to five fold expansion. Single cylinder engines being liable to break down under the severe strain of a high rate of expansion; while the second cylinder of a compound engine with safety permits the full advantage to be taken of the highest rate.

ELECTRIC SIGNALLING IN MINES.—The signals that have to be sent up and down the shafts and along the slopes and planes of the mines are at present transmitted by the ordinary system of lever and wire.

In England the use of electricity to convey signals underground was introduced some years ago, but the more general adoption of electric signalling has only been of late years, since greater efficiency has been attained in the batteries and apparatus required.

The advantages of the system are, that signals may be transmitted instantaneously to and from the bankhead or engine house, or any part of the plane; and that the expense of maintenance is small, nothing the first year, and from $4 to $7 a year afterwards for re-charging the batteries.

The advantages of the system over the ordinary lever and wire system are not so apparent on short inclines, where the strain on the moveable wire is comparatively slight, but as the inclines lengthen, the laborious, slow, and expensive nature of the latter becomes more evident. The labor and time required in signalling is not inconsiderable and the long moveable wire is liable to stretch and break and occasion delay in the traffic for repairs.

The first cost of the two systems on a plane of 500 yards in length is about the same, while the expense of maintenance and renewal is very much less in the case of the electric system.

Mr. Hoyt, the agent for the Acadia Coal Company has furnished for comparison the following estimated cost of the materials required for the ordinary system:

500 yards of wire, $\frac{3}{8}$ inch diameter, of 7 galvanized wires at 10 cts.	$50.00
50 slings for suspending the signal wire	10.00
Rapping gear at bottom of incline	25.00
Rapper at landing	5.00
Signal bell in engine house	20.00
	$110.00

Mr. Radcliffe, Telegraphic Engineer of Birmingham, has supplied the following estimated cost of the materials re-

quired for an engine plane 500 yards long to signal from any or all parts of the plane to the engine house only :

1 Non-rapper bell..	£4.10.0
12 Cell battery	3.18.0
3 Rapper bells and buttons to be fixed at points where signals are most frequently sent from	.18.0
66 Side or roof brackets and shackles complete	£4. 2.6
280 lbs galvanized iron telegraph wire, bare	3. 2.6
20 yards thick guttapercha covered copper wire, taped	. 8.4
5 lbs Binding wire	. 2.1
Instructions for fixing and plan of connections	3. 3.0
	£20. 4.5

Neither of these estimates includes the cost of fixing, which would be about the same in both. Mr. Radclifte further writes, in reference to his system, that the cost varies considerably, according to the nature of the signalling requirements, and that the various articles are specially made for colliery purposes. Some pits signal merely from any part of the plane to the engine house; the simplest and most general plan. Others signal from the engine house to the bottom of the plane, and also from the bottom of the plane to the engine house. In some instances intermediate bells are fixed at different points, but in all cases signals can be transmitted from all parts of the plane to the engine house. Rapper bells for both sending and receiving signals are £5 each.

Mr. J. P. Jackson speaking of the system at a meeting of the Chesterfield and Derbyshire Institute of Engineers said: "We have it at our collieries at Clay Cross, and I consider it has paid for itself over and over again in the economy of labor and time in signalling. Where a man would have to pull a heavy lever ten times to signal, the electric system does it in an instant. Then, again, there is no breakage; or if there should be, any man who understands it can join the wire again in a minute or two; with the old or lever system it took a considerable time. In cases of falls of bind it is most valuable; and, in fact, I can recommend it to any one who has a long engine plane, or even the case of very deep mines in shafts."

Messrs. Siemens Brothers have also given their attention to this subject, and they have constructed a magneto-inductor in combination with an alarum. This they contend is preferable to batteries, as its power remains constant and is unaffected by damp. The signals are sent by turning a handle at the signal station, and cannot be transmitted by merely

bringing the wires in contact at any point on a plane, which is one of the advantages that batteries possess. The expense of signalling, both up and down a shaft, is estimated at twenty-one pounds sterling. Where it is only desired to signal in one direction the expense is about halved, as the inductor may be separated from the alarum bells.

SPONTANEOUS COMBUSTION OF COAL.—This subject is now being investigated before a Royal Commission, sitting at London, and the results of the enquiry it is expected, will be published during the year. As the report will be well worthy of a careful study by our coal miners and coal dealers, their attention may, with advantage, be directed to the subject, that, when the report is published, they may seek for it to see wherein the suggestions it contains may possibly be applicable to their individual cases and requirements.

It would be worse than useless to try to ignore the fact that on several occasions some of our Cape Breton coals have taken fire from spontaneous combustion, as other bituminous coals of Great Britain and the United States have done, and that consequently we must be prepared to acknowledge a liability will always exist unless proper precautions are taken in the future. It cannot be denied that coals have often hitherto been shipped in an inferior condition, and that there is room for improvement in the methods of handling coal. The coal is too much exposed to the weather, and it is broken up too much to withstand long, and even sometimes short voyages, without suffering serious deterioration. The excuse which is sometimes made, that it won't pay to take any more care, is make in thoughtlessness and indifference to the true interests of the trade. It is beyond question that two cents worth of more care previous to and during shipment, is worth at least twenty-five or more cents a ton at the port of discharge.

The liability to spontaneous combustion is, as has been stated, not singular to the coals of Cape Breton. Statistics show that most if not all the kinds of bituminous coal exported from the United Kingdom, are liable to take fire when in heaps or in confinement. The statement has been made by the Underwriters' Association, of Liverpool, that of the vessels carrying upwards of 500 tons of coal to ports south of the Equator, 2 per cent. were lost from this cause in 1873, and as high as 4 per cent. in 1874. Some information in connection with this matter has been collected on this side of the Atlantic, and it has shown that probably all kinds of American bituminous coals are subject to spon-

taneous combustion. Even the best gas coals, Penn and Westmoreland, containing only a small per centage of sulphur, have taken fire in the coal sheds of the gas companies using them.

The theory hitherto generally entertained, attributed spontaneous combustion solely to the presence of pyrites in the coal. There is every reason to believe that it often largely assists, but that it is necessarily the cause, is shown to be a matter of doubt by the spontaneous combustion on four separate occasions at Boston, of some Albertite, which contains no sulphur The increased per centage of casualties in 1874, over the preceding year, is attributed in Great Britain to the extra demand in that year causing the quality of the coals exported to be overlooked; less care being taken than in former years to reject the "brasses," shaly portions and fine coal. It is now strongly surmised, as the result of experiments tend to show, that coal, like fine charcoal, when damp and in a heap, absorbs oxygen on exposure to the atmosphere, and forming carbonic acid developes heat. The carbonaceous matter of the coal as well as pyrites, oxidizing on exposure. It has also been found that the coals most liable to spontaneous combustion are not those which contain the most sulphur. It is generally expected that the report of the Commission will be adverse to the ordinary system of partially ventilating the holds of vessels, and possibly be in favor of hermetically sealing the hatches. It is fully anticipated that a recommendation will be made, that coal for long voyages be put on board dry, and as large as possible, that the area of coal surface, exposed to the action of the air and moisture, may be kept as small as possible.

Closely connected with this matter is the deterioration to which, as is well known, all coals are liable on exposure. To what extent they are is seldom considered. Dr. Varrentrass has made public the results of some of his experiments. He found that a sample of bituminous coal for some time exposed to the weather lost more than one-third of its weight, and that its value was still more reduced. The yield of gas was diminished 45 per cent., and the heating power 47 per cent; while a sample of the same coal protected from the weather lost only 25 per cent. of its gas producing power, and 10 per cent. of its heating power. The loss in both cases being due to the oxidation of the volatile constituents of the coal; and their reduction in their amount was

attended by an increased relative percentage of the ash, fixed carbon and sulphur.

Dr. Estes Howe, of Boston, who has paid much attention to the deterioration of gas coals in sheds and open heaps, reports that it is the universal opinion of the workmen at gas works that all coal heaps go through a heating process, and when that is once over they think it does not recur. His own observations had led him to make close enquiry of the workmen.

Mr. Armington of the Brooklyn Gas Company has of late made a series of tests with the object of confirming this opinion, and guarding against actual ignition. He places gas pipes in the heaps at regular intervals, and daily takes the temperature in each. His observations have invariably shown a temperature higher than that of the atmosphere in heaps recently accumulated. In general this elevation slowly subsides after reaching perhaps 120° to 130° Fahrenheit, even in the best coals under cover. In open heaps average temperatures of 130° to 140° Fahrenheit have been registered. Among the points noticed is the irregularity of the heating, which occasionally is exceedingly local. When it rises to 200° Fahrenheit, the heated portion of the heap is turned over, and the free exposure to dry air has, in general, the effect of cooling it.

Proportionate to the degree of heating, which the heap undergoes must be the deterioration of the quality of the coal, and the reduction in its value for gas and steam purposes.

It would be interesting and instructive to know the extent of the heating which fresh mined coal undergoes in the winter heaps at the collieries.

Unfenced Mines.—In the 9th Chapter of the Revised Statutes 'of Mines and Minerals,' clause 135 reads:

"Any person leaving any pit, hole, or excavation, for the space of eight days, open and unfilled to the depth of three feet or more, without having the same walled or fenced round, at least four feet in height, at all times when not working the same, shall forfeit for each offence a sum not exceeding one hundred dollars, to be recovered by any person who will sue for the same.

136. "Parties violating the provisions of the preceding section shall be guilty of a distinct offence for every day that such pit, hole or excavation, shall remain open and unfilled, or without the proper wall or fence."

No action, so far as is known, was ever taken under the authority of the above clause until in the past year, when a suit was brought at Guysborough against the Eldorado Company, of Wine Harbor, for leaving pits open and unfenced. Claim 2,200 dollars. But as no legal agent of the company could be found the case was dismissed.

In the early days of gold mining, some attention was paid to the clause, and in some districts abandoned pits were fenced. But as many mines were unsuccessful, further expenditure, merely to make unprofitable excavations secure, was generally avoided. No one being sufficiently interested in the matter to bring an action; the law came to be looked upon as only available in the event of damage accruing from neglect. What was anybody's business was nobody's business, and so general had the neglect become, when the Mines Regulation Chapter came in force, that it was an exception to find the letter of the law complied with. This act requires in *General Rule* 13, that:

"The top of every shaft, which, for the time being, is out of use, or used only as an air shaft, shall be securely fenced * * * so far as is reasonably practicable in every mine."

Now many areas are held by persons absent from the Province. Some are worked by tributers not legally responsible. Others have excavations made years ago, and left unprotected before they came into the hands of the present holders, as for example, the shafts sunk by the prospectors in the small lots, 20 by 50 feet, first leased in some districts. Then there is the excuse, that the pits have been fenced but that the fences have been taken away for fire wood by the very people for whose protection they were erected. For these reasons it was then felt that the progress of enforcing the law through the authority given to the inspector would be slow, yet there are now more unprotected pits than it was anticipated there would be at the present time.

By specially directing the attention of the owners, or agents of property, to some of the unprotected holes that have come under my notice, compliance with the law, has been in cases attained; and it was hoped in this way that others would recognize the necessity of attending to this matter; but it is now feared that it may be advisable to resort to sterner measures, and with your sanction make examples of some delinquents.

In order that all who live in a mining district may know that there is now a law which can, for the protection of life, be enforced against known offenders, it is required that an abstract of the act be kept posted in a conspicuous place. But unless they who are directly interested, they who have cattle and children liable to fall into the unprotected pits and excavations about their dwellings, take the trouble to make a complaint, they can hardly wonder that the miners sometimes take advantage of their carelessness. That the law should take cognizance of the matter of unprotected pits is undisputed and well recognized as essential, but the absence of the desired effect following the passage of the law in the Chapter of Mines and Minerals, suggests a doubt as to the expediency of keeping the unsuccessful clause referred to, unaltered in the statute book; more especially as in its present form it allows malice to use it as a cloak for revenge under the disguise of attaining the desired object.

Further leases are often taken out by irresponsible persons, who have no more stake in the welfare of the property than the two dollars an area they have paid for them. Others are held by unamenable tributers, working to-day and away to-morrow. Thus there is no means of preventing such persons from committing a nuisance by opening pits, and leaving them open and unprotected when they abandon them. I would therefore propose that all applications for leases should be accompanied by bonds of two local sureties binding the lessees on abandoning their claim to leave the property safe for the public and the land owner, just as licenses to search for minerals, other than gold are now issued, subject to bonds to indemnify the land owner for damage done to his land. As a convenience for reference I append the following extracts from the mining laws of Great Britain.

METALLIFEROUS MINES REGULATION.

"13. When any mine, to which this Act applies, is abandoned, or the working thereof discontinued, at whatever time such abandonment or discontinuance occurred, the owner thereof, and every other person interested in the minerals of the mine, shall cause the top of the sha t, and any side entrance from the surface to be, and to be kept securely fenced for the prevention of accidents.

Provided that—

(1.) Subject to any contract to the contrary, the owner of the mine shall, as between him and any other person inter-

ested in the minerals of the mine, be liable to carry into effect this section, and to pay any costs incurred by any other person interested in the minerals of the mine in carrying this section into effect.

(2.) When such abandonment or discontinuance has occurred in the case of a mine before the passing of this Act, this section shall apply only to such shaft or side entrance of the mine as is situate within fifty yards of any highway, road, footpath, or place of public resort, or in open or unenclosed land, or not being situate as aforesaid, is required by an inspector, in writing, to be fenced, on the ground that it is specially dangerous.

(3) Nothing in this Act shall exempt any person from any liability under any other act or otherwise. If any person fail to act in conformity with this section he shall be guilty of an offence against this Act. Any shaft or side entrance which is not fenced, as required by this section, and is within fifty yards of any highway, road, footpath, or place of public resort, or is in open or unenclosed land, or is required by an inspector, as aforesaid, to be fenced, shall be deemed to be a nuisance within the meaning of section eight of the nuisances Removal Act for England, 1855, as amended and extended by the Sanitary Act of 1866.

General Rules.

"(6.) The top of every shaft which was opened before the commencement of the actual working for the time being of the mine, and has not been used during such actual working, shall, if so required, in writing, by the Inspector of the district, be securely fenced, and the top of every other shaft which, for the time being, is out of use, or used only as an air shaft, shall be securely fenced."

PROSPECTING

FOR MINERALS OTHER THAN GOLD.

As there was little immediate inducement offered to holders of Licenses to search and work to prospect their areas in the hopes of showing their value and effecting a sale, little was done in the way of exploration during 1875.

The following comparative statement shows that the areas of lands held under mining rights were smaller than those secured two years ago.

Year.	Licenses to search.					Licenses to work.
	1st	2nd	3rd	4th	5th	
1873	313	111	52	23	7	95
1875	229	75	20	4	1	87

During the past year the rights were held most numerously in the Counties of Cumberland, Pictou, Cape Breton, Inverness, Colchester, Antigonish, Richmond and Victoria, in the order given.

COAL MINING.

CUMBERLAND COUNTY.

The trade of Cumberland County alone shows an increase; exceeding by 11,000 tons that of the previous year. The increase steadily rose from 14,000 in 1872, to 26,000 in 1873; and from 49,600 in 1874, to 60,944 tons in 1875. The local sales were 1,000 tons of round and 1,000 of stock, in excess of the year before; and the exports to New Brunswick increased 11,000 tons; while the trade with the United States decreased 2,000 tons, These figures are given in round numbers.

The Spring Hill and Parrsborough railway was again taken in hand, and the work of grading and bridge building pushed on, and almost, if not fully, completed. It is expected that the rails will be laid during the coming season. The completion of this railway, and the construction of an efficient dock or pier at Parrsborough, should permit of a further steady increase of the coal trade of this County.

On lease 31, adjoining on the south, that of the Joggins Coal Mining Association, a bore hole was put down at the corner, where the road turns in to the Joggins mine, and the Joggins main seam pierced at the depth of 1028 feet. The hole was made by an American Diamond Drill, owned by Mr. John Logan and others, of Pictou, the same that was mentioned in the last report, as having done its work so

satisfactorily in Pictou County. Mr. Logan states that the actual time occupied in drilling the hole was 47 days, but as they had the misfortune to break the force pump on tapping a strong spring of water, there was a detention of six weeks during which time the men were still kept on wages, and the expenses were consequently greatly increased. Even then the whole expenses including the moving of the machine, railway freight and fares, erecting derrick, fuel, labor, &c., only amounted to $937; and allowing fifty cents per foot for wear and tear the average cost of the hole, 1028 feet deep, was only $1.41 per foot. A hole of that depth bored by hand would have cost more than three times the amount. The machine was worked night and day by a man and a boy, on each shift. In the first length of 500 feet, 42 feet was the greatest depth bored in one day; in the second 500 feet, 29 feet was the best day's work. The spring of water tapped by the hole was so strong, that the water flowed out of the top of the tube 15 feet above the surface. Had it been desired to sink an artesian well, a better site could not have been selected.

The work of exploring with the English Diamond Drill was discontinued after the boring of one or two more holes, and the machine was sent out of the country. It was used on the areas leased to Mr. Domville, on what is called the property of the Spring Hill and Parrsborough Railway Company, and a bore hole 350 feet deep, was put down through the measures overlying the Black seam to the West of the school-house fault. Two overlying seams, before unknown, were discovered; to both of which the cores gave a thickness of three feet. But two trial pits sunk on the crop of one of the seams, proved it to have a thickness of 7 feet 4 inches, to 8 feet. The other seam underlying about 60 feet was not similiarly proved. The drill was then taken to the Nova Scotia colliery and a hole bored from the bottom of the furnace pit to a depth of 500 feet in 22 working days. It was subsequented taken back to the Joggins, where a second hole will be put down.

The school-house fault is said to be a down-throw of 600 feet, and from it the explorations have traced the Black seam in a direction east of south, a total distance of 1,400 feet without finding any indications of other troubles. The extreme southern limit of the series of trial pits, show the seams to be rapidly turning to the east, and apparently to conform with those some time ago discovered on Mr. Sharp's area.

No other reports of explorations made in this field have been received, except from the New Dominion Coal Company, who have further proved the seams on the area of the Hon. A J. Smith. The level on the main seam has been driven 400 feet, and from it two drifts have been driven northerly, which have intersected two other seams; the first 2 feet 3 inches thick, at a distance of 16 feet, and the second 22 inches in thickness, at a distance of 29 feet from the main seam. It is expected that a slope will be put down on the main seam during the ensuing Summer, to test the quality of the coal to the deep. The seam varies in thickness from 4 feet to 5 feet 6 inches, with a parting of fire clay, which, under more of the cover of the hill, is only 6 to 8 inches in thickness.

COLLIERIES.

SPRING HILL.

The mining of coal from the West or Hall slope has been stopped, the workings alone being kept free from water. In the East or Byers slope the levels have been so extended that the faces are now 800 feet apart. The level going east has met with some difficulties, being first troubled with a roll in the floor, and then with a thickening of the parting. The rooms have been driven horizontally 12 feet wide, leaving pillars seven or eight yards in thickness. One counterbalance has been put up on the east side, and two on the west, to lower the coal from the upper rooms to the level. The workings are drained by a direct acting steam pump, which forces the water a vertical height of 437 feet, through a column 820 feet long. The pump has a 22 inch cylinder, 30 inch stroke, and nine inch plunger. To clean the slack coal of dust and fire clay, and to prepare it the better for market, a screening apparatus has been erected. The coal from the screen is hoisted by a small engine 42 feet above the track, and passed through a circular screen four feet in diameter and 22 feet long. The upper nine feet is of five-eighths inch mesh, then follows four feet of half inch mesh, and then nine feet of seven-eighths inch mesh. The coal that passed through the upper lengths is thrown away, and that which goes through the lower lengths is called nut coal.

The fine coal which is thrown away, possibly might, if it were washed, make good coke in a proper oven. The rough experiment noticed under the head of COKE cannot be

accepted as a final test of the value of this coal for coke, and as there is every likelihood of the demand at Londonderry being large a proper trial should be made.

SCOTIA.

No coal was drawn from the pit of this colliery during the summer, when some changes were made in the roads underground. Flanged wheels have been substituted on the new tubs for plain wheels, running within a guard on a wooden rail. A place 400 feet east of the slope has been put up to the surface, and made a travelling and air-way. The level extends about 700 feet from the slope bottom.

JOGGINS TRACT.

When this area of four square miles was disposed of to the present owners, it was equally divided between the two companies, the Joggins Coal Mining Association, and the Joggins Coal Mining Company; the former taking the old workings on the Joggins main seam, and the latter taking the northern section containing the Hard-scrabble seam.

JOGGINS SOUTH.

The Association did not mine so much as in late years, for their trade with St. John was affected by the coal sent in there by rail from Spring Hill, and by vessels accepting low freights from Cape Breton. In the pit the levels of the lower lift have been extended, and the faces are now about half a mile apart. The pillars in the first working are left 6 yards thick, and the bords of the same width, are driven 350 feet, or to within 15 yards of the next plane-way, and then the pillars are brought back. The fire-clay from the parting thrown behind, stows up the places, and allows the roof to settle without falling. Owing to the slackness of trade the pillars were left standing the latter part of the year. A direct acting steam-pump, with a 14 inch cylinder, and 7 inch plunger has replaced the force pump which was worked by rods carried down the slope from the surface engine.

Above ground an apparatus has been put up for separating the duff from the slack. An endless chain with shallow cast iron buckets, similar in arrangement to grain and sawdust elevators, carries the slack from the main screens up into the upper end of an inclined circular sieve made double; the inner separated 3 inches from the outer, and made of a coarser mesh to prevent the clogging of wet coal. Only the fine that passes through both is thrown away.

CUMBERLAND.

The Joggins Company have opened this colliery on the seam at Hard-scrabble. The slope has been started a third of a mile from the shore and driven down 270 feet, at which depth levels have been started to the right and left. An inclined tunnel 400 feet long, through the cliff, connects the mine with the wharf. The winding engine has two horizontal 11 inch cylinders, 30 inch stroke, and geared three to one to a drum 8 feet in diameter. The three boilers, 25 feet long and 2 feet 9 inches in diameter are hung from baulks of timber, and are all three fired together.

LAWRENCE.

A few tons were taken out of this mine to supply the local demand; and from the area held by

GILBERT SEAMAN,

on the River Hebert, some 500 tons were mined for the use of the Freestone Quarries, at the Lower Cove.

PICTOU COUNTY.

The total coal sales of this County, while they exceeded those of 1873 by some 3000 tons, show a decline, when compared with the trade of the year before, of nearly 21,000 tons. A quantity which is less by some 20,000 tons than that the sales of the Acadia Company are short of their annual average. That company has again yielded the first place in the list of shipments, which for some years it held, and the Albion Mines has regained its old supremacy. The falling off, in the home consumption is small, 4,000 out of a total of 107,000 tons; in the United States trade it is very considerable, over 29,000 tons; and in the trade with the West Indies nearly 17,000 tons. These heavy losses of trade were in part balanced by the considerable increase in the shipments to the Province of Quebec, 32,000 tons more than the 116,000 sent in 1874. The trade with other markets showed fluctuations of little moment. There is one increase yet to be noticed, that, in the demand for slack, which has steadily advanced, Prince Edward Island being the largest customer, and taking 26,000 tons.

In the general article on the Trade with the United States, explanations are given of the probable reasons for the falling off in the Pictou trade with that country; but, although there is

little prospect of a demand for gas purposes again arising, should the import duty be taken off and the iron industry revive, that industry will likely require large quantities of this coal, which is so well adapted for its purposes.

COLLIERIES.

ACADIA.

The large reductions in the sales from this colliery compared with those of late years, are stated to be due to the unwillingness of the owners to sell at rates lower than those which they had fixed as the minimum. Certainly no other reason is discernable, for the workings have never been of late years in so good a condition to do a large business, and the quality of the coal of the seam worked is beyond dispute.

In the pit the lowest lift, which gives a winning of 350 feet and a total length to the slope of 1575 feet, has the levels so extended that there are, at the present time, some 32 bords broken off from the existing planeways, and sufficient room for two new planeways, 600 feet inside, to be started.

In the lift above the pillars are being taken away. The system now adopted is to begin in the pillars five or six yards back from the fall, and work towards the broken. In this way very little of the upper coal is lost, and the falls are not so heavy as before. The great difficulty in working the pillars in this seam arises from the seam being thick and lying at a high angle of inclination. Hitherto the whole of the good coal in the lower bench of the pillars has been lost. It is now proposed to leave this coal untouched in the first working, and bring it all back from under the fall. If this can be profitably done a great saving of coal will be effected. The systematic trials that have been made to work this seam to the most advantage, are deserving of praise. The nut from the coal of the Acadia seam is much sought after for house use, and answers admirably in the Dubuque and other soft coal base-burners.

ALBION MINES.

The pair of stone drifts from the Main seam in the Foord pit, have reached the Deep seam, at a distance of 185 yards, and proved it there to contain 20 feet of good coal. The stone parting, which is 4 feet thick to the rise, was found only 9 inches thick, and the overlying coal to have increased from 4 feet to 4 feet 6 inches in thickness. This satisfactory condition of the seam, has induced the starting of an incline, from the Cage pit workings, in a south-easterly direction, to open

up that portion of the Deep seam. Until the drifts from the Main seam proved the coal to be of good quality, doubts had been entertained, because of the inferior quality of that immediately to the rise, into which, some time ago, levels had been driven. The principal operations in the Cage pit have been towards the north, and three counter-balances are now going on that side of the incline, and one has been started off the level on the south side. The under-ground engine has been replaced by another which brings the rake up with greater ease and speed. The return air-ways have been enlarged, and some 30,000 feet of air now circulate through the workings. The special pump at the foot of the incline now delivers the exhaust steam into the suction, and while freeing the workings of a great inconvenience assists the pump at its work. The boilers on the surface have been shedded over, whereby a saving of fuel is effected, and protection given to the stokers during inclement weather. The great distance to which steam has to be taken to the pump underground, causes a condensation of over 50 per cent., and doubtless a saving would be effected, were the steam pipe coated for its whole length with some non-conducting material.

In the Foord pit the north levels have, for some time, been checked by a fault which has at last been pierced, and the coal found beyond. The south side also met a fault, but which was not expected to give much trouble.

In hoisting the coal, the double deck cages holding four tubs are now used, and thus about 80 per cent. more coal can be brought to bank in a given time.

For the workmen, additional accommodation of a superior class has been provided. A boarding house containing 14 rooms, and eight blocks of two dwellings, each having a porch and containing four rooms.

The new coke ovens erected, and the attention given to the making of coke. will be found mentioned in another portion of this report.

INTERCOLONIAL.

All the old workings of the Drummond Colliery have now been recovered down to the bottom of the pumping shaft, and the work of clearing the slope and levels goes on. Some delay was occasioned by a fire taking place in the workings off No. 4 slope. On the 27th of March a holing was made into the old workings, on the south side of the fault between Nos. 1 and 4, which did not appear on the plan. It will be remembered that

by the terrible explosion of May 1873 all the officials, who could give accurate information as to the extent of the work not shown on the plan, were lost. Although care was taken, with the intention of leaving a barrier of solid coal intervening between the old and new workings, and rooms were stopped that were thought to be approaching the old workings, a connection was made through one of the rooms above, and fire-damp that lay inside, pouring through, ignited at a lamp and set fire to the coal. The collier at work was but slightly injured, and all the men escaped, though the pit had to be abandoned so quickly that two horses were lost. This accident confirms the action of the law, which requires proper attention to be paid to the plans. The first attempt to smother the fire was by closing the openings of the pit as tight as possible, and that not proving effective, steam and carbonic acid gas were injected, but also unsuccessfully. Then a strong dam was built in the drift, between Nos. 1 and 4 slopes, and the fire extinquished by water.

The coal mined was taken from the No. 4 slope, and from the pillars above the third level on the north side of No. 2 slope. The pillars on the south side have been so much damaged by fire that it is improbable that any coal will be recovered from them. The workings off No. 4 slope showed that the fault, separating them from those of No. 1, after running straight for about 1000 feet, turns southerly, and it will probably be cut by the continuation of No. 4. The heavy fault bounding the workings on the south-west also so turns; an attempt will be made to prove by a bore hole the extent to which it troubles the seam.

The ventilation is now controlled by a fan, made at Wilkes-Barre, Pennsylvania. In principle it is the same as the Guibal in use at the Foord pit. It is, however, smaller, 20 feet in diameter and 6 feet wide. The periphery is cased with cast iron segments. The fan is driven by a single 14 inch cylinder engine, and when making 36 revolutions per minute, produces a ventilation of 59,000 cubic feet of air. The fan is set back some 20 feet from the old furnace pit, to which the returns are conducted, and a covered incline way leads the air direct to the centre of the fan. This is a better position for a fan to occupy than to have it close to the upcast, for the draught is better; and then, should an explosion occur, the covering of the pit would be alone knocked away, the fan would remain uninjured and ventilation could speedily be restored by a temporary covering of canvas and boards.

NOVA SCOTIA.

The levels to the north have been further driven, and at the face of the workings the seam appears to be more highly inclined

than at the slope. The slope has not been sunk any further than the fault which last year was reported as having been struck. In the article on Direct Acting Steam Pumps, the advantage found at this colliery of turning the exhaust steam from the engine into the suction of the pump is mentioned. For the present the arrangement has been given up, because the steam was found to heat the water so much that the column of pipes was strained, and the flanges sometimes broken. The plan is still pursued in the auxiliary pump, which throws the water from the lowest level up to the main pump on the fourth level.

An apparatus has been devised for cleaning the slack, instead of washing it as was proposed, and it is found to satisfactorily answer the purpose required. Underneath the ordinary screens, which have the bars three quarters of an inch apart, are other wire screens, of half inch mesh, hung by short rods, parallel to the main screens, and tied together by rods. They are given a reciprocating motion, which effects the necessary separation of the dust from the slack, by means of an eccentric on a shaft driven by a small oscillating engine.

VALE.

Some changes have been made in the method of working the McBain seam at this colliery. The pillars are now left 20 feet thick, and the bords have been widened to 16 feet. A second level has been driven below the main level as an air and water course, and horses have been introduced to facilitate the transit. On the west side a fault of 20 feet has been met with and pierced.

On the surface there are now 92 tenements for the accommodation of the workmen. Near the junction with the Pictou branch railway a locomotive shed has been put up, and a new locomotive obtained, suitable for the ordinary guage to which the railway track was changed during the summer.

No work of any moment was done on Mitchell and Barton's area.

CAPE BRETON COUNTY.

The continued decline in the production of coal in this County has been a source of much suffering to the mining population, and it is greatly to be feared that unless a change for the better soon takes place in the trade, numbers of the men usually

engaged about the mines will have to seek elsewhere for work, and in new occupations find employment. For not even in the United States are the collieries open to them, since the trade is there equally as dull and overdone as it is here.

Comparing the past with the previous year, there appears a total decline of 32,314 tons; made up principally in the reduced shipments to the United States and West Indies, to which countries, dull as the trade was during the preceding year, nearly 18,000 and 15,000 tons more were then sent. The home consumption merely shows an increase of three hundred tons. The trade with Newfoundland shows alone a marked increase, some 5,000 tons. This advance, however, can hardly be considered permanent, as the supplies were unusually short in St. John's, during the winter of 74–75, and those held in the present winter of 75–76 are unusually large.

The anticipated completion of the Sydney and Louisburg railway was frustrated by the failure of the Company who undertook to build it. This is much to be regretted, as it was hoped it would test the convenience of Louisburg as a winter port of call for ocean steamships short of fuel. It is, however, expected that arrangements may be made, which will allow of its completion during the current year.

COLLIERIES.

SYDNEY.

The two collieries of the General Mining Association, Sydney and Lingan, shipped over one-third of the total shipments from Cape Breton. The workings of this colliery were in a better condition than in 1874 to supply the steady demand for coal, which it secures, even if other collieries of the County lie idle. A borehole from the workings of the new winning relieved the Queen pit workings to the deep of the water, which of late years has contracted the available area of the pit, and the working places on the south side to the rise have passed beyond the trouble which interfered somewhat with the size of the coal delivered. A section of pillars on the north side of the pit has been worked. At the new winning the pumping pit, which was sunk to the seam in the autumn of 1874, has been temporarily fitted up to draw coal in single tub cages until the permanent winding shaft is completed. A heapstead has been erected for screening and preparing the coal for shipment, and the branch railway has been completed to convey it to the shipping wharf. Underground increased standage for water is being provided, and working places are being won out, with a

view to raising an increased quantity of coal during the ensuing season. Meanwhile the sinking of the shaft, originally intended for the hoisting shaft, is being proceeded with. A drift has been driven from the pumping shaft underneath the second shaft, and some fifty feet below the measures that carry the feeder of water; and a bore hole has been put through from the bottom of the shaft to draw off the water while the sinking goes on. At the present time the upper length of tubbing, similar to that placed in the other shaft, is being put in to shut off all the leakage from the top downwards. When this is accomplished, the depth remaining to be sunk will be about 300 feet. At one time the feeder gave 1000 gallons of water to be pumped, but now it has been reduced to about 700 per minute.

LINGAN

The pumping out of the water, that was allowed to accumulate in the workings after the accident in 1873, was again resumed in May, and is still continued. As soon as the water was lowered sufficiently to allow an entrance, the new pair of levels, started in the previous year, were continued and driven by a double shift of men. The water is now nearly removed from the entire extent of the workings, and the mine is again in good working order. The principal workings during the season were in the new district where some sixteen rooms, 6 yards wide, and separated by 12 yard pillars, were broken off. Heavy falls in the slant road, where the fire took place, delayed the work of opening up the south side, where the mining was confined to the removal of a few pillars.

Owing to the depressed state of the trade, the completion of the new winding engine, and other projected improvements have been deferred.

COLLINS.

The property at the Little Bras d'Or, adjoining that of the General Mining Association on the south, known as the Collins mine, has been purchased, it is reported, by the Toronto Coal Mining Company; but the transfer does not appear on the register. The old slope, known as Guthro's, has been driven to the surface and to the deep, and has now a total length of 528 feet; it is to be made the working slope of the mine. A tram way and wharf have been built, and other preparations made for shipping from the Little Bras d'Or during the ensuing season.

INGRAHAM.

This adjoining property contains the out-crop of the Indian Cove and other underlying seams, and a level has been started to win a slice of the crop coal to supply the local demand.

VICTORIA.

The output from this colliery was some 3000 tons more than in 1874, though it is still very moderate in amount. The only change to be noted beyond the inevitable wear and tear, has been in the pit. From the lowest levels off the main slope at a depth of 985 feet, subsidiary inclines have been driven on the extreme dip, about 135 feet, which give three horizontal bords. The coal is brought up to the lowest main level by having three bords working to the rise at the same time, and providing an equal quantity of coal. Then, by having the descending tub to counterbalance the other ascending, a horse is able to supply power to produce motion. Since the system of working has been changed, from driving the bords to the rise to driving them parallel to the level, better coal is got with less powder, ventilation is better and easier, and less anxiety is occasioned on the score of gas collecting at the faces. The coal is quite dry to the deep and easily wrought; by shearing on the low side, and taking one fall out with powder, the proud state of the coal makes the rest work and come away in blocks soon after it is holed.

RESERVE.

Owing to the Cape Breton Company, the reputed owner of this, the Emery, and Schooner Pond collieries, having gone into liquidation, active mining has been suspended. The pit was reopened in February by pumping out the water that had collected to a depth of 600 feet in the slope, and mining prosecuted until June ; since which time no other work than pumping has been done. The slope has been extended 114 feet, which gives it a total length of 2085 feet A distance of 230 feet more will bring it to the bounding barrier. The air crossings have been enlarged.

EMERY.

This colliery was reopened in March, and the water which had collected to a depth of 1100 feet in the slope, was pumped out. The pit now makes about 6000 gallons an hour, and is kept free by two of Cameron's patent special pumps. Mining in this pit was also stopped in June, after some 8000 tons had been extracted. The slope has now a total length of 1208 feet, and has about 290 feet to go before it reaches the boundary of the area.

SCHOONER POND.

The pit remained closed, but some 1600 tons of the coal in stock were disposed of.

CALEDONIA.

The trade with the United States, upon which this colliery chiefly depended for a business, having declined so much, very little was done. The pit was kept open, and is now worked on a very reduced scale; a few men obtaining employment by cutting and stowing coal in the rooms behind them, in such position as not to interfere with the ventilation of the mine. When a pit is in such a condition as to permit of this being done, and the men stow the coal they cut at their own cost, the system is to be commended at such a time as this, when men can get no other occupation. The coal so stowed is very little inferior to fresh mined coal, for it does not deteriorate so rapidly or to such an extent, as that banked and exposed to the weather on the surface. The system, however, allows of but a small quantity being cut and so disposed of during the winter months, and it could not be made the general practice in brisk times.

GLACE BAY.

The Hub pit at the Roost, after the pumps and rails were withdrawn, was allowed to fill with water.

The Sterling pit on the Harbor seam was sunk until it reached the coal, and was then for the time stopped. Some of the machinery to work it has been put in place; a winding engine and four plain cylindrical boilers, 30 inches in diameter. The engine of the tug J. C. Harrison, that exploded its boiler, was recovered, and put in order to drive the lathe and the feed pump. The sinking of the winding shaft has been also for the present stopped, as the feeder of water through the quarry sandstone bed is heavy, and makes the further sinking with pumps expensive. When the trade requires an additional output, the shaft already completed will be pumped out, a drift put through the coal underneath the future winding shaft and a bore hole made to draw off the water to the permanent pumps, which will allow the sinking to be pushed on at very much less expense.

The railway track has been put in order, the wharf renewed, and much of its superstructure replaced. The mining of coal has been of late in the Harbor pit, and the levels have been continued to the westward. At the extreme faces the coal is 6 feet 6 inches thick, while at the eastern faces it is only 5 feet thick. At a distance of 1000 feet from the shaft a pair of dips were started and driven down some 400 feet; they made very little water.

In July the engine house was destroyed by fire, but the machinery was so little injured that it was again in working order within a fortnight.

INTERNATIONAL.

In the system of working, and in the plant of this colliery no change has to be noted. The sales exceeded those of the previous year some 12,000 tons, and rank next in quantity to those of Sydney mines in the county list.

GARDINER.

Like nearly all the Cape Breton collieries this is now in a condition to put out very much more coal than there is at present a demand for. The shipments, compared with those of the previous year, show a falling off of over 3000 tons. The only noteworthy change to be mentioned is that the boilers are fitted with Bayley's steam-whistle, which indicates extreme high and low water; but judging by the care that is taken of the machinery the warning must be seldom required.

ONTARIO.

The output from this colliery was of the usual amount, a little over 5000 tons. A portable engine, somewhat more powerful than the one it replaced, is used to bring the coal up the slope. The operations in the pit have been of the ordinary character.

BLOCKHOUSE.

In common with several other collieries, the pit lay idle during the winter of 1874-5. In the spring, however, some business was made by the demand in Halifax, the drift ice on the coast preventing vessels getting further to the eastward than Cow Bay. The business of the year fell a good deal short of that of the preceding

Late in the autumn, an explosion of one of the steam boilers occurred, and did much damage to the engine house. Fortunately, it was unattended by loss of life. A further notice of the explosion will be found under the heading, Accidents.

GOWRIE.

No change of moment has to be noted in the pit workings. The amount of work done has been a decrease as at many other establishments, though at this but to a small extent.

At the new winning, the sinking of the pit is still standing within 10 feet of the coal, awaiting busier times to warrant the completion of the works. The machinery for hoisting is in position, and the fittings are very substantial and complete.

The breakwater, which protects the shipping pier, and makes a refuge for vessels in the Bay during storms, has been purchased from Messrs. Archibald & Co., by the Dominion Government, and is being put in thorough repair.

SOUTH HEAD.

A small quantity of coal was raised and shipped by this colliery after the pit had been put in order, and a shipping wharf contrived. The work of restoring the wharf, which had been built and destroyed three years ago, was begun in June. Of the old wharf the outer block alone remained, three intermediate blocks were put down, and from trestles on them wire ropes were suspended. On this were placed ties and rails; and the wagons ran over them from the cliff to the end of the wharf. This super-structure has since been destroyed by an autumn gale.

PROSPECTING.

Has disclosed, it is reported, a three feet seam of coal on Le Cras' area, near Sydney; and a six feet seam by Neville and others, in the Cow Bay basin west of Sand lake, probably one of the Long Beach seams.

VICTORIA COUNTY.

New Campbellton has been the only colliery open in this County. The work of opening out the lower lift in the pit has been continued, and the north level has been driven 410 feet, and the south 240 feet. It is proposed to drive a level to cut off the surface water, which is heavy: it will require to be about 15 chains in length. Scales to weigh the coal have been set up, and a locomotive engine imported but not yet used. Sheds, capable of holding 1500 tons of coal, have been erected to protect the banked coal from the weather. This precaution is most wise, and might, I feel assured, be followed with profit by other companies, who find it necessary to give employment to their men during winter months by banking coal.

INVERNESS COUNTY.

On the area adjoining the Cape Breton Company's property at Port Hood on the north, and held under license to search by E. D. Tremain and others, a slope has been begun and driven in the seam to win the coal lying under

the waters of the harbor, held under lease by Dr. Murray of New Glasgow. The slope has been driven, by agreement, through ground not held by the company at work; it will enter the area leased at a distance of 478 feet on the pitch of the seam, and have a minimum cover of 150 feet. At 600 feet there will probably be a sufficient cover of solid measures to permit a proportion of the coal to be removed to the deep of that point. The slope dips at an angle of 23·5°, N. 70 W. It starts about 2220 feet north of the slope worked some years ago by the Cape Breton Company, but now abandoned, in the same seam worked by Mr. Pelton; and about two hundred yards north of the Light house. It is now down about 400 feet, and a return slope is driven parallel to it to a depth of 250 feet. The main slope is 10 feet 9 inches wide, and 6 feet high.

A hoisting engine has been erected, and is now at work. It has a single 12 inch cylinder, with a two foot stroke, and a drum 6 feet in diameter. Steam is supplied by two plain cylindrical boilers, 30 feet long, and 30 inches in diameter. A bank head has been erected, which will give a height of 20 feet for the screens. No workshops or dwellings have had to be erected, as existing buildings have hitherto satisfied the requirements of this which has been designated the Port Hood colliery. Mr. J. P. Lawson is the agent and manager; he reports that the site of the wharf has not yet been fixed, and that no arrangements have yet been made for the building of it or the railway.

The destruction of the bar which connected with Smith's island exposing the harbor to the north winds, is a great drawback to the opening of any colliery on this shore. As the public wharf, 500 feet long, is fast silting up with the drift from the north; it is thought by men who have had some experience at such work on the coast, that sunken blocks, well balasted, would, with comparative quickness, collect the drift, and that in this way the bar might be restored. Of course the expense would be very considerable. The growth of Dean shoals since the destruction of the bar, shows the great tendency of the drift to accumulate under lea of the island.

At one time it was hoped that the seams under the waters of the harbor might be won by a shaft sunk on the island, but the lower carboniferous rocks of which it is composed, point to a serious dislocation, and a probability of cutting heavy feeders of water in the event of any attempt being made.

The Cape Breton Company shipped outside the Light, but the ice was there very destructive to the wharf. To ship inside a wharf of considerable length will be required.

COLCHESTER COUNTY.

Trial pits have been sunk at two localities in this county in search of coal; on the banks of the North River, and at the base of Folly Mountain. On the North River about seven miles from Truro a seam of impure coal was found dipping north and very highly inclined. The indications were not considered sufficiently favorable to warrant further explorations on the seam.

At the base of Folly Mountain near where the Steel Company of Canada have opened the iron deposits of that section, two small seams of coal are reported to have been discovered. At the time of my visit to the district the trial pits were full of water, so that I am unable to verify the following statement: "The outcrops of the two seams are 1536 feet apart, and steeply inclined dip towards each other. The one dipping south is 20 inches thick and the other dipping north 18 inches thick." They are probably the outcrops of the same seam confined in a narrow basin at the foot of the mountain. The quality for crop coal seemed to be very fair, but the thinness of the seam and the high angle at which it rests make it doubtful if it will be anywhere found worth working.

The outcrop of a small seam has been found at several places along the base of the Cobequids all the way to Greville Bay, and it likely belongs to the same horizon below the main coal measures.

COAL ANALYSES.

SEAMS.	Specific gravity.	Moisture and Volatile matter.	Fixed Carbon.	Ash.	Sulphur.	Coke in lbs per ton.	Cubic feet of gas per ton.	Candle power.	C. ft. of gas purified by 1 bus. Lime.	Authorities.
Joggins, (Main)....	...	38.80	56.00	5.20	...	...	...	...	...	Dawson.
Victoria..............	1.34	36.00	51.84	12.16	...	...	9,340	...	...	
Spring Hill, (13 feet seam)	...	25.38	60.95	13.67	...	...	...	...	...	How.
	...	...	...	10.80	.84	...	...	...	...	Woodhouse.
Black seam 11 ft.	...	35.39	60.46	4.15	.22	...	...	...	...	Hartley.
	...	31.08	64.94	3.98	.31	...	...	...	...	
	...	...	...	5.05	1.09	...	...	...	...	Dr. Percy.
Albion, (Main)..	1.32	29.63	56.98	13.39	.77	...	7,180	15	...	Johnson.
		29.53	60.83	9.62	...	...	...	...	...	Dawson.
	1.30	25.75	66.50	7.74	.55	...	...	...	...	How.
Albion, (Deep)	1.33	26.74	61.65	10.25	.86	...	...	...	...	Broome.
	1.34	23.00	68.50	8.50	1.68	...	...	...	...	How.
McGregor.....	1.32	22.90	67.85	9.35	...	1640	9,500	13	...	Manhattan Gas
Stellar................	1.10	66.56	25.23	8.21	.00	...	...	...	...	How.
Acadia...	1.32	34.37	57.57	7.55	.50	...	...	...	...	Broome.
	1.31	29.93	60.35	9.46	.26	...	...	...	...	Broome.
	1.32	31.69	60.32	7.56	.42	...	...	...	...	Broome.
McBain	1.36	25.45	62.63	11.92	.49	...	...	...	...	How.
Collin's........	1.27	36.75	57.10	6.06	...	...	...	...	...	Chapman.
Blockhouse	...	38.80	55.80	5.40	...	...	...	...	...	Dr. Torrey.
	...	40.80	55.70	3.50	...	1460	10,217	17	2304	Manhattan Gas
	...	31.94	62.79	5.25	3.75	...	...	...	...	Harrington.
Phelan	1.32	37.26	58.39	4.35	2.17	...	9,500	16.5	...	
	...	35.47	61.67	2.86	2.06	...	...	...	...	Harrington.
Emery.............	...	38.10	58.45	3.45	...	...	9,500	...	...	Percy.
	...	31.75	66.85	1.40	1.21	...	...	...	...	Harrington.
Lorway (Gardiner)	...	34.33	61.97	3.70	1.18	...	...	...	...	Harrington.
Hub...............	..	36.54	62.53	.93	...	1484	9,560	13	1945	
	...	28.62	65.85	3.24	2.29	1342	10,080	16	...	Harrington.
Harbor	1.27	36.28	58.56	5.16	...	1480	9,846	16.7	1850	
	...	30.21	67.78	2.01	.90	...	...	...	...	Harrington.
	...	38.50	56.50	5.00	...	...	...	...	...	Manhattan Gas
	...	34.09	62.92	2.99	2.29	1440	10,106	17	2314	Harrington.
Lingan............	1.28	...	...	7.81	2.18	1441	9,900	17	...	Imperial Gas.
	...	35.20	60.80	4.00	...	1450	9,520	13	2200	Chandler.
	...	34.23	63.98	1.79	.77	...	...	...	...	Harrington.
	...	30.03	66.91	3.06	...	...	...	...	...	How.
Ross..................	...	38.70	58.40	2.96	...	...	...	...	...	Dawson.
Sydney (Main)...	1.33	26.94	67.57	5.49	...	...	...	...	...	Johnson.
	...	31.87	64.59	3.54	...	...	6,500	...	...	How.
	1.30	34.18	61.50	4.32	1.24	...	...	...	...	How.
Edward's............	1.27	36.74	56.97	6.27	...	...	...	...	...	Chapman.
McAuley..........	1.33	28.88	60.45	7.25	3.42	...	...	...	...	
	...	36.15	58.01	5.70	2.34	1510	9,000	15	...	Richard.
	...	32.07	64.43	3.50	2.86	...	...	...	...	Harrington.

For other analyses see How's "Mineralogy of Nova Scotia 1868," and the Geological Survey Reports of Progress.

GOLD MINING.

Among the tables appended to this report will be found a General Annual Summary and a recapitulation of the yearly produce of each district from 1862 to 1875 inclusive. Statements are also given with them which show the approximate yearly average yield per man per day, and year. As the system of collecting returns was not established until 1862, the quantities obtained during the previous year when gold was first worked in the Province, have to be guessed at. Mr. A. Heatherington, who took great pains to collect data, estimated the yield at 6000 ounces, which must be added to an annual percentage for that stolen and unreported in order to get at the sum total of the gold produced. He estimated the quantity not reported at 10 per cent. An estimate that I have no means of verifying or questioning; but whatever may have been the amount so to be accounted for in the first years of the industry, I feel very sure that of late years it has not exceeded 2 per cent. That small lots of presumably stolen gold have not been reported is strongly suspected; but the opportunities now for disposing of stolen gold are not very great, and those that do exist might be further reduced were gold miners to see that the Dominion Act of 1869, Chap. 21 respecting "Larceny of Mines" was enforced. Small lots are said to have at times been bought by jewellers who have made no return of their purchases to the Commissioner; and who, it would seem, are not always sufficiently careful to be sure of the honesty of those of whom they buy. It is also said that liquor dealers have received gold from liquor-sellers living in districts where by law no liquor should be sold. The liquor-sellers having taken in payment "sights" stolen by workmen from the mine or the mill. The action of the Legislature in prohibiting the sale of intoxicating liquors in gold districts was a beneficial one; and it is to be regretted that the law has not been enforced in all, for where it has not the sale has a most marked demoralizing effect on the district. The good it has done is observable at Goldenville where a combined action has kept the traffic from the village, and where a spirit of honesty is the better maintained.

It is satisfactory to notice that an increase has taken place, in the total production of gold, in the Province. All the districts, except Montagu, Wine Harbor, and the unproclaimed, show a yield greater than that of the year before. The total increase is 2068 ounces, which makes the production only 644 ounces behind that of 1873, when 11,852 ounces were mined in Nova Scotia. Of the mines in operation, the most valuable are the Wellington at Sherbrooke, the mine worked by Mr. McClure on the Union lead at Waverley, and Mr. Donaldson's mine at Oldham.

In the General and District Summaries, the yield per man per day can only be considered approximately correct, for while there is no reason to doubt but that many of the returns of labor performed have been compiled from actual records, it is highly probable that some have been filled in from memory alone, and on them absolute reliance cannot be placed. Still the proportion is so small, that the value of the general averages can hardly be appreciably affected. It offers, therefore, a comparatively fair basis, on which a true valuation of our gold mines may be estimated.

It is certainly difficult, if not impossible, to judge of the value of a mine alone by the yield per ton as is sometimes attempted. Nor is it right to sweepingly condemn the want of skill in our miners, when they are sometimes unable to make a lead carrying 10 dwts. or more pay, because, it is said, in Australia veins carrying 5 dwts., or even less, are sometimes worked at a profit; for a thin lead yielding twice as much per ton as a thicker lead may not be so profitably worked. Nor does the cost of mining per square foot on the lead alone give correct data on which to found a calculation; but taken together with the thickness of the lead a fair average result may be obtained.

The labor averages, which are given in the tables, are suggestive of the relative values of the several districts. And knowing that labor costs, on an average, somewhat over $1.25 a day, all the average rates under that amount may be unhesitatingly considered as representing an actual loss on labor alone, besides whatever expense was incurred in connection with the erection of machinery, and in the use of materials about the mines.

To what cause the increase in the yield of 1875 is chiefly due is not easy to determine. Whether the general dullness of business, and the reduced demand for labor, have driven more men to seek employment at the gold mines than

otherwise would have been the case, is a matter of doubt, and, chiefly so, because the average yield per man is higher than during 1874. Some credit may possibly be due to the introduction and use of dynamite for blasting in the mines, but as the quantity consumed in the gold districts is unknown, it would not be wise to unduly credit it with a result for which no proofs are supplied.

Returns have been sent in from several of the districts of the number of stamps employed, and of the days that they were in operation. But as sufficient care was not taken to see that the days returned were of 24 hours each, no reliance can be placed on any, except on that from Sherbrooke, which shows that the average for that district was slightly under one ton of stuff crushed per stamp per day. The returns from the other districts have not been entered in the table. The highest monthly average was during the summer, but it did not exceed 1.11 tons per stamp per day. Of the mills employed the Palmerston gave the highest average, and the return from that mill for the month of August shows that 1.21 tons were crushed per stamp per day. The keeping of these returns with accuracy is much to be commended, for then the relative efficiency of the several mills would be demonstrated; and possibly a spirit of rivalry among the millmen might be induced by the publication of the returns, which would do much towards further increasing the efficiency of both mills and millmen.

In the general summary the stated value of the gold is estimated at $18 per ounce of unsmelted gold, which is the legal valuation for calculating the royalty due to the Crown. The actual value of smelted gold varies from $18 to $19.40 per ounce, while its average value is $19.22. The gold of this Province is unusually pure and free from base metals, the fineness varying from 918½ with 79 parts of silver, to 968 with 22 parts of silver. The least fine coming from Uniacke district, and the most from the conglomerate of Gay's river. The quartz veins at Oldham yield the purest gold, 964½ parts fine, with 30 parts of silver.

DISTRICTS.

STORMONT.

On the property formerly owned by the Union Company, and worked with the adjoining areas in 1874, by Mr. Hattie, the soil overlying the bed rock, immediately south of the lead, has been profitably milled. Of late, work has been

done at a profit to the tributers, on the stringers from the main lead, which had been left untouched on the south wall.

Another set of tributers have been working in a small way, on the Allan property, and principally on a lead 80 feet south of the Mulgrave lead.

The operations at Johnston's brook have been stopped.

WINE HARBOR.

The leads at the Barrasois have been abandoned. All the work that has been done in the district, has been done by tributers, chiefly on the property of the Eldorado Company, who, as a company, have entirely suspended operations. The tributers have been taking the upper unwrought portions of the Plough lead that were left in the first working to keep the walls asunder. They have also been working on the Mitchell lead, taking away the blocks of the vein left between the small claims into which the district was originally granted. On the middle lead a short level was driven to the westward through a fault, to drain a portion that stands at a higher level than the tunnel. The quartz mined by the tributers is crushed for them in the mill owned by the company.

SHERBROOKE.

The yield of gold from this district was more than half the total production of the Province, and higher than it has been since 1871; and the value per ton of stuff crushed greater than it has been since 1867. The total yield was 5,818 ounces, of which more than 3,000 ounces were mined by the Wellington Company from areas 620, 621 and 622, Block III. The chief operations were on the Wellington lead, which was re-opened late in the previous year. It confirmed the good opinion its owners had of it, and has warranted them in going to the expense of erecting the new machinery. The original main shaft was 500 feet deep on the lead, and this shaft has since been extended. The principal operations during the summer were to the west of the shaft, as the streak has a course in that direction. The streak of rich quartz being below the level of the shaft bottom, was extracted by means of an incline plane worked by a wire-rope conducted down the shaft from the surface. The pumping was also effected by means of a wire rope. The main pump has two sets 5 inches in diameter, and worked by rods from the surface. The new winding engine has a single horizontal cylinder 16 inches in diameter,

with a 30 inch stroke. By means of belting and shafting it drives the pumps in both the Wellington and Dewar leads and hoists from the different shafts. The lead is some 20 inches thick, and to the west of the slope is thrown to the south by a fault which, if it does anything, enriches it. A small sucker about an inch in thickness on the footwall was found to be very rich where it passed through the 18 inch belt of slate, but it was found to become poor where it entered the adjoining band of quartzite.

On the Dewar lead which overlies the Wellington, the west shaft is down 356 feet, and all the water made in the lead is drained to it. The workings extend 400 feet east to the Rockville property, which drained by these workings has been again re-opened.

Mr. Swickl has taken the Grapevine property, areas 614 and 615, Block III, and he has opened a lead which he calls the McClure, and another 40 feet south of it, lying immediately north of the Grapevine lead. The two leads are small, not more than two inches in thickness. They have been found rich in spots, but the gold streaks are small and do not extend longitudinally more than 60 feet, and on the McClure lead to a greater vertical depth than 160 feet. The old machinery belonging to the Grapevine has been utilized.

The workings on the South lead on the Dominion property were for the present closed in August. The slopes extended about 100 feet in length and to a depth of 130 feet. The extension of the same lead on the Palmerston property was worked until the end of the year and in connection with the Dominion property by Mr. Fraser and others. The stopes extend 170 feet. The same lead, though separated by a barrier from these mines, has been worked on the Meridian property to a depth of 120 feet, and for a distance of 140 feet on the lead. To the east, where it is cut off by cross leads, it is 5 inches thick, and carries about 5 dwts. to the ton; to the west it thickens to 8 or 10 inches, and is rich in spots.

Mr. Cleverdon has been working the Stryker lead, which is about 5 inches wide, on the property of the British Company, to a depth of some 70 feet, stoping it for a length of 60 feet. Sears lead, 20 feet south of the Stryker lead, has been worked by other tributers. Prospectors have opened leads to the south of this belt, and near the old Meridian lead. On the property of the Meridian company a surface trench was cut for 140 feet in a northerly direction from the

north lead, which exposed the outcrop of two leads, 6 inches and 15 inches wide, which are said to be barren. On the Palmerston property a lead has lately been opened, close to the north lead, which, it is said, does not show in this trench.

On the Chicago property tributers have been taking the upper portions of the leads which were left when the mines were first opened.

FIFTEEN MILE STREAM.

The company of Sherbrooke men continued to work the Jackson lead on areas 884 and 885, until the autumn, when they had the misfortune to lose their horses, owing to the badness of the road, or rather from the absence of one; and they for a time abandoned work. It is to be regretted that the means of access to so promising a district is so bad. At present for part of the way there is but a path suitable only for pack-horses, except of course in winter, when a covering of snow and ice allows a good road to be quickly made.

On the Jackson lead the stopes extend about 100 feet; at the east end is the bailing shaft, and the water is hoisted by horse whims. The lead is one of the thickest worked, being about 30 inches wide at the rolls, which follow one another closely at distances of only 6 to 10 feet. To the east the lead thins, and the rolls are not so large, numerous or rich, as in the western end of the stope, where work in the latter part of the season was resumed. The lead is almost vertical, but it has a slight southerly dip.

Mr. Walton was busy draining his areas and prospecting them. He deepened the brook's course and drained some of the 'stills.' In the same section of the district the brothers Hall paid much attention to draining the swamp, and in their ditches exposed several leads. The subsoil appeared to be rich enough to pay for putting it through a mill. On area 992 they have opened the Island lead, which yields very promising looking quartz.

CARIBOU.

The only work done during the year in this district was by Mr. Caffery, on the Hyde lead, on areas 227 and 228. Small parcels of quartz were taken from other areas by prospectors, and altogether some 446 ounces were obtained.

During the autumn work was temporarily abandoned, but it is expected to be resumed during the present winter.

OLDHAM.

More men were at work, and the yield of the district was larger than in 1874, although operations were suspended during the severe winter of 74–75. The principal mining was carried on by Mr. Donaldson on areas 130 and 131, and by Mr. E. McDonald on areas 322 and 323.

The fault met with in Donaldson's mine throws the lead some 16 or 18 feet to the north, it itself dips to the north-east at a low angle. It caused much trouble in opening up below it and in the rearranging of the pumps. The surrounding surface is but partially drained, so that the amount of water made in the mine is often great. The pump used is what is known as a Glasgow 6 inch pump, which has a bucket working in a chamber in the aitch piece just as a plunger pump works. The advantages of having a bucket instead of a plunger in such a position are not very apparent. The mill returns continue to show that the value of the lead is unimpaired.

Mr. E. McDonald has continued to work the angling lead which is supposed to be the extension of the Hall lead on the Sterling property area 533. The lead varies in thickness from half an inch downwards; it is richest where it passes through quartzite, and differs in this respect from most of the others of the same kind in the district. A second lead near by was alone rich when in slate. More attention has been paid to these angling leads of late as they have been found, even if very small to be often rich. The term "angling" has been given to them because unlike the ordinary gold bearing leads in this Province which are nearly all strata veins, they lie a little out of the line o parallelism with the containing beds, and gradually stea across from slate to quartzite, and from quartzite to slate.

The angling lead on area 533 has been stoped on a length of 200 feet, to a depth of 40 feet. Its general dip is nearly vertical with a slight northerly inclination. The slates also dip north, but at such an angle that the lead cuts through a bed at a depth six times its thickness; then it breaks south across the quartzite bed, at right angles to the bedding, until it strikes the next bed of slate, when it again continues downward.

Some work was also done by Mr. Shaffer in the early part of the season on the Hall lead, and subsequently Mr. McAllister and others worked the property, having found the belt lead on area 540, to be poor. In June, Messrs. A.

McDonald and Co., reopened the Frankfort lead, on the Sterling property. It had previously been mined along some 300 feet of the crop, to a depth of 20 to 30 feet, and in the centre opened to a depth of 100 feet, where the lead is richer. The late work has been done in the eastern of the two centre shafts, following the gold streak which has an easterly dip. The lead averages 4 inches in thickness.

Prospecting was carried on in other portions of the district, and attempts again made to profitably work abandoned pits. The Dunbrack lead in Block IV, and the Barrel lead were reopened.

GAY'S RIVER.

The mining of the conglomerate which lies unconformably on the Silurian slates, and is capped by carboniferous shales, was continued on area 40 until October, when the workings were temporarily closed while the autumn rains continued.

The removal of the auriferous conglomerate has been chiefly from the rise portion of the workings. and from a depression in the bed-rock, which is slate. Pillars of conglomerate have been left to support the roof and props placed, to indicate any subsidence.

A trial pit, 700 feet to the west of the workings, proved the continuous existence of the conglomerate. but the pit did not reach the auriferous portion next the slate, as the water was heavy.

An attempt was made to drift along the top of the bed rock from the bluff, easterly towards the brook, but as the bed rock dipped in that direction, water soon overpowered the workmen. Then a shaft was begun and sunk some 21 feet in the endeavor to reach the bed rock, with the object of proving, if possible, the presence of alluvial gold, in the debris of the conglomerate, but was unsuccessful.

Other parties prospected a little on area 7, on the side of the brook, below the mill-dam, and by washing the conglomerate they succeeded in collecting a few ounces.

RENFREW.

The returns show only 48 ounces as the yield of this district, though the number of men at times working there would have suggested a greater return. The quantity does not include some ounces of gold which were said to have been extracted from the tailings at the free claim.

The work done partook largely of an experimental character. A little was done on the Preeper lead, areas 342 and 343, and search made for its continuation to the west, beyond a fault which is supposed to throw the lead to the north. On area 319 the Clements lead, which is 18 inches thick, was for a short time worked. It yielded a trifle over 3 dwts. to the ton The chief yield was from a lead overlying the Preeper, which was worked by Mr. Macdonald, on area 344, for the Hartford Mining Company. It yielded 15 dwts. to the ton.

UNIACKE.

The miners living in the district continued to work the outcrops of the leads on the property of the Montreal Mining Association, chiefly on a lead on area 682, Block II. The lead is from eighteen inches to two feet in thickness, and is drained by the cross tunnel, which cuts a number of leads and was driven across the measures some years ago, from a main pumping shaft, at a depth of 108 feet. The principal work in the latter part of the year, was carried on by the Uniacke Gold Mining Company, under the management of Mr Prince, on area 678. It is expected that there will be a slight revival of interest in the district, and that the produce for the current year will be largely in excess of that for the past three seasons.

TANGIER.

In the Strawberry Hill section, Mr. Townsend, during the early part of the year, mined on the Dunbrack lead, and extracted some 107 ounces of gold. During the remainder of the year, he was engaged in erecting a donkey engine, for pumping and hoisting on the Forrest lead, which he proposes to work during the ensuing season. He has put the English steam crusher in repair; the water-mill, hitherto used in the district, having been too much damaged to warrant any expenditure on it. Mr. Forrest, the other principal miner in the section, confined his operations on the Murphy lead, which lies to the north of the Dunbrack. He took down a stope of 70 feet from No. 1 shaft, to a depth of 88 feet; from No. 2 shaft to a depth of 45 feet, a stope 45 west, to No. 1 shaft, and a stope 35 feet east to the same depth; from shaft No. 3, which is 35 feet deep, stopes 25 feet west and 15 feet east were taken No. 4 shaft is 30 feet deep with a stope of 20 feet west. Thirty feet north of the lead, and at the western end of his stoping ground, he has erected a new eight stamp steam mill. The engine of which, by means of belting, will drive also the pumps, and do the hoisting.

Some prospecting was done on the property of the Burlington Company, and on new ground to the South of the district.

At Mooseland operations have been continued on the Irving lead, and a stope of 70 feet taken down to a depth of 90 feet. The lead is 6 to 10 inches thick and is worked together with the little Irving lead, a quarter of an inch thick, which in spots has been found very rich.

MONTAGU.

The only actual mining in this district was on the cross lead area 1461. A trifling amount of work was done at Bendigo, on area 1166, the property of Messrs DeWolf; on leases 78,83, 84,99 and 103 belonging to Messrs. Lawson; and on a few other odd claims throughout the district. On the cross lead the stope of 25 feet in length has been taken down to a depth of 180 feet. The workings are vertical and as the ladders are also vertical, several sollars or platforms have been put in by the side of the travelling ladders on which men may rest in their ascent. Much new timber had to be put in, as the upper workings had not been opened for some years prior to the previous autumn when operations were resumed. The mine makes a good deal of water which is removed by pumps worked by rods connected with the engine of the mill. The hoisting of the rock and quartz is also effected by the same engine.

The same party of tributers intend to extend their operations and also work the adjoining Sarah lead, which was formerly opened to a depth of 40 feet, using the same mill engine to supply the requisite power.

WAVERLEY.

On Laidlaw's hill from area 156 tributers have taken a few ounces of gold. The work done has been to prove, by a shaft 80 feet deep, the presence of a lead further down the ravine towards the lakes than the leads of barrel quartz have been hitherto found. And on Morton's property a drain has been cut to draw off the water from the quarry-like excavation and expose a greater surface of the barrel quartz on the crest of the hill.

The actual mining in the district was on Mr. McClure's property, adjoining that of Mr. DeWolf; chiefly on the Union lead, areas 169 and 170.

Some explorations were made on leads in other areas 174 and 191, but the Union lead was alone steadily worked.

Under Mr. Huff's management the returns show very satisfactory yields. The two shafts are 96 feet apart and they have been sunk to a depth of 140 feet. The stoping is carried on up to the break 24 feet east of the shaft, and a tunnel has been driven to find if possible, the extension of the lead.

A company styling themselves the British Gold Mining Company have taken Messrs. DeWolf's property conditionally. They have put the stamp mill in repair, and erected a new hoisting engine. The work of retimbering the shafts has been very thoroughly done, and 5 shafts on the Tudor lead, 4 on the North lead, and 7 on the Union lead have been put in working order to a depth of 160 feet. Their returns do not show that they have yet extracted much gold.

LAWRENCETOWN.

Late in the year work was again resumed in this district, but the returns of quartz crushed, and gold produced were not made until after the year closed.

HARRIGAN COVE.

Early in the season some 15 tons of quartz were mined and crushed by Mr. Smith, which yielded over nine ounces of gold.

CRANBERRY HEAD.

From the mine at the Cream-pot over 29 ounces were extracted from 38 tons of quartz during the winter months. The operations have since been abandoned.

IRON.

The Dominion of Canada imported during the fiscal year ended June 30th, 1875, pig iron to the value of $1,229,989, and railway bars, fish-plates, frogs, &c., to the value of $5,289,454; and during the following three months, pig iron to the value of $237,103. These figures show the large demand in the Dominion for pig iron and wrought bars of iron and steel, and to some degree the extent of the market in which home manufacturers may expect to compete. The

trade in more detail is shown in the accompanying tables, for which I am indebted to the courtesy of the Hon. William Ross, the Collector of Customs at Halifax.

The great depression that has of late existed in the iron trade has retarded the developement of this industry in this Province. But more attention is now being directed to it, as the extent and character of the explored deposits become better known, and some enquiries have lately been made for rich ores to export, for admixture with the ores of Pennsylvania. Prospectors, however, did little or nothing during the past year to open up new ground.

The Steel Company of Canada have confined their operations at Londonderry chiefly to those of a preparatory character, driving adits and levels to open the deposits, and accumulate stocks of ore on the surface, erecting blast furnaces, stoves, engine-houses and dwellings, and building tramways and branch railways to convey the ore from the mines to the works.

The charcoal blast furnace belonging to this company was kept in operation, and produced in the season some 1909 tons of pig iron. An experiment made in it with Albion Mines coke proved the eminently satisfactory character of that coke for use in blast furnaces. An analysis of the coke is appended, and it will be noticed that it contains but a small percentage of sulphur; it is therefore, in that respect especially suitable for iron making.

At the Steel Works, spoken of in the last report, where Siemens' Direct Process has been adopted, a series of tests have been conducted by Mr. Wopplington, the manager. The results are at present private, but they are understood to have shown the satisfactory nature of the process for the treatment of the Londonderry ores. The rotators erected since the last report was written are somewhat different in dimensions to those then given; they are ten feet long by seven feet in diameter.

The house for the blowing engines has been completed, and the foundations for two blast furnaces laid. The furnaces will probably be completed in June, and have a height of 63 feet, a diameter of 19 feet at the boshes, and 5 feet at the hearth. Such furnaces are expected to produce 600 to 700 tons of metal each per week; but as the consumption of pig iron in the Lower Provinces is, at present, only about 6000 tons annually, a market will have to be sought in Ontario and Quebec, and abroad, until the low-

ness of price and the quality of the metal induce the erection of rolling mills and extensive foundries.

The mining department has been vigorously pushed on under the charge of the managers, Messrs. Bryant, and some 300 miners on an average were employed; of whom 200 were Cornishmen, and of them 130 have been specially imported by the company. Some 16 adits are in course of being driven at the principal points along the line of the deposits. At Cook's brook one has been driven to the west 580 feet, and it has yet to go 350 feet before it is expected to cut the ore bed at a depth of 150 feet from the surface. Another has been driven in the east bank 585 feet, and has yet to go 230 feet more to reach the deposit of ore. At Slack's brook an adit has been driven 980 feet, and it is shortly expected to strike the ore. A surface level, No. 2, at Martin's brook, proved the existence of much ore in ground supposed to be nearly worked out. No. 7, the lowest adit of all, has been driven 1290 feet. On the east side of Londonderry the mining operations have been confined to Folly Mountain, where 5 adits are in course of being driven at various depths, for draining the extensive ore deposits already discovered in that locality. The deepest striking the ore ground 250 feet from the surface. The total quantity of ore in sight is variously estimated up to 300,000 tons.

To convey the ore from the west mines at Martin's brook to the furnaces at Londonderry, a tramway of three feet gauge, two and a half miles long, has been built and laid with steel rails; and a branch of the ordinary four feet, eight inches and a half gauge, five miles long, connects the east mines at the base of Folly Mountain, with the Intercolonial railway at DeBert station, and so with the works at Londonderry.

Messrs. Stearns and Page, who control the lands at Cleveland, on the west side of the Nictaux River, Annapolis County, have had some of the ores there analyzed by Dr. Walz, of New York, and Dr. Drown, of Philadelphia, who report that the quality of the samples taken to them is very good.

ANALYSES OF CLEVELAND ORE.

	Magnetic Black Oxide.			Red Oxide.	
Metallic Iron	54.22	59.11	53.14	58.05	57.93
Silica	14.97	11.64	....	....	17.21
Sulphur	.069	.09	....	....	.036
Phosphorus	.36	.17	.172	.193	.16
Alumina	5.53	....	....	....	......
Lime	2.70	....	....	. ..	......
Magnesia	.41	.....	....	....	....
Oxide of Manganese	.86	....	....	.....	......

At Springville on the East River of Pictou further explorations on the iron deposits of that section were made. The areas, previously held under Licenses, were leased, surveyed, and the corners marked by stone posts sunk four feet in the ground. The surveys also proved the relative position of the areas to one another. Mr. Edwin Gilpin conducted the explorations, and he reports that, on license to work No. 11 which lies to the south of the Big Brook, near the Pictou branch of the railway, the vein of brown ore on that area was proved to be 3 feet in thickness, and that its extension was followed one-third of a mile to the Westward. While prospecting several beds of drift brown ore were intersected, which Mr. Gilpin thinks could be profitably worked. On license to work No. 7 a bed of red hematite 12 feet wide was discovered, and on lease No. 28, which is known as the Ross area, the outcrop of a bed of red hematite was found. Other indications of a bed of red hematite appeared on license to search No. 102. Specimens of the various ores, &c., from this locality have been collected for the approaching Philadelphia exhibition.

A limestone found in this neighborhood, which it is thought will be suitable for iron smelting, has been analyzed, and its analysis is given under the heading Limestone.

The extracts which are appended, and taken from the Returns of the Board of Trade of Great Britain, and the Returns of the United States Customs Department suggest the extent to which the business in Iron is carried on in the Dominion.

Tho MINERAL STATISTICS of the United Kingdom show that the following quantities of Pig Iron were exported to British North America in the years mentioned, 1872, 87,007 tons, valued at 490,288 pounds; 1873, 25,830 tons, valued

at 169,866 pounds; and 1874, 22,713 tons, valued at 104,612 pounds. The last quantity stated is considerably under that given in the Return of the Board of Trade.

UNITED STATES BUREAU OF STATISTICS 1874–5.

Iron, and manufactures of.	
To Nova Scotia, &c	$1.204,022
To Quebec, Ontario, &c	1.861,102
British Columbia	115,539
Newfoundland	16,489
Additions from Canadian Reports	1,801,436
	$4.998,588

THE BOARD OF TRADE OF GREAT BRITAIN.

Shipments of Iron *and* Steel *to British North America.*

	Quantities.		Value.	
	1874.	1875.	1874.	1875.
	Tons.	Tons.	£	£
Pig Iron	30,013	37,489	163,405	152,745
Bar, Angle, Bolt and Rod	28,366	22,495	315,553	208,683
Railroad of all sorts	62,850	85,168	681,343	917,637
Hoops, Sheets and Boiler Plates	10,282	7,536	164,695	117,982
Tin Plates	3,512	4,138	110,168	118,004
Cast or Wrought Manufactures	26,653	15,360	436,567	247,525

NOTE. -Old iron, unwrought steel, steam engines, and other description of machinery and mill-work, if sent, are not included in the above table.

THE DOMINION IMPORTED, 1874 5.

	Pig Iron.		Railway Bars, Frogs, Fish Plates, &c., of wrought Iron and Steel.	
From	Cwts., (100 lbs.)	$	Cwts., (100 lbs.)	$
Great Britain	548,247	600,355	1,373,807	4,319,845
United States	438,683	622,693	256,405	965,388
France	4,955	6,866	....	....
Holland	....	....	1,280	2,628
Newfoundland	26	75	....	....
	991,951	1,229,989	1,631,492	5,289,861

NOTE.—One ton, (2,240 lbs), of pig iron, is therefore valued at $27.77; while by the Board of Trade return for 1875, the pig iron exported from England, was valued at £4 1 5 a ton.

STATEMENT shewing the quantity and value of Pig Iron, &c., imported into the Dominion of Canada, by Provinces, during the fiscal years ending the 30th June, 1874 and 1875, respectively.

PROVINCES.	1874. IRON—SCRAP, GALVANIZED OR PIG, BARS PUDDLED, BLOOMS, BILLETS AND SPIKES, GALVANIZED.		1875. PIG IRON.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.		Cwt.	
Ontario	229,990	$571,974	363,026	$509,103
Quebec...............		744,288	503,608	546,466
Nova Scotia..........	37,553	69,085	36,221	52,951
New Brunswick......	8,054	93,524	86,198	116,748
British Columbia......		2,286	1,940	2,498
Prince Edward Island.	1,507	4,163	958	2,223
Manitoba	....	541	....	....
	277,104	$1,485,861	991,951	$1,229,989

STATEMENT shewing the quantity and value of Pig Iron imported into the Dominion of Canada, by Provinces during the three months ended 30th September, 1875.

PROVINCES.	CWT.	$	REMARKS.
Ontario..................	49,957	47,520	Hamilton principally.
Quebec	221,980	176,812	Montreal and Quebec only.
Nova Scotia...........	3,340	2,671	Halifax principally.
New Brunswick	11,700	9,692	St. John only.
Manitoba	"	"	
British Columbia.....	"	"	
P. E. Island...........	502	408	Charlottetown.
	287,479	237,103	

LEAD.

The vein mentioned in the report for 1874 as containing galena near Port Hood, C. B., is of no commercial value. It is, however, interesting on account of its position, being in the sandstones of the coal measures between two seams of coal.

A vein which promises better has been found near Caledonia, in Guysborough County. Beyond exposing the outcrop no work has been done. It is said to be from 8 to 15 inches wide where opened, and to contain bands of pure galena 2 to 3 inches wide, a specimen of the ore is in the exhibition collection, and analyses give the following composition :

	No. 1.	No. 2.
Lead	86.12	86.02
*Silver	.044	.049
Iron	.07	.02
Copper	.03	.03
Zinc	absent	absent
Arsenic	mere trace	mere trace
Antimony	mere trace	mere trace
Sulphur	13.32	13.30
Lime	trace	trace
Magnesia	trace	.18
Silica, (sand)	.426	.402
Moisture	trace	trace
	100.00	100.00
*Equal to per ton	15.75 oz	17.75 oz.

Doubtless the district contains other and larger veins carrying galena, and judging by the samples shown, it offers a fair field to the prospector.

COPPER.

Spasmodic efforts have for nearly forty years been made to find the vein from which the boulders of copper ore came which from time to time were found in the soil near Polson's Lake, Antigonish County. At last a vein containing copper pyrites has been discovered, but as the explorers found that their opening was not on their own ground, no further work was done to prove the vein; which seems to have a course nearly east and west and to dip north with the containing slates. The vein was found by sinking through the surface soil 16 feet to the bed rock, over which a drift was driven that laid bare the vein. The vein is 6 feet wide where exposed; and appeared to consist chiefly of spathose ore, spotted with copper pyrites. The explorer Mr. McBain, who discovered the McBain seam, now worked at the Vale colliery, doubts if he has found the main vein. His explorations to the east indicate, he thinks, an extension in that direction, but the fall rains prevented his further search. To the westward he found the ore bed but not the vein, for there also his work was stopped by the wetness of the ground. The ore bed and accompanying slates are similar in appearance to the rocks at Londonderry in which the deposits of iron ore exist. The spathose ore associated with the copper pyrites weathers where it has been exposed and forms an ochre, still retaining the cleavage of the ore. It is probable that the deposits of iron ore at Londonderry and the spathose ore with copper pyrites at Polson's Lake are of the same age.

Near Lochaber Lake he has found two cross veins showing copper pyrites, erubescite, and specular ore with quartz as a matrix.

COKE.

The successful trial of Albion Mines coke in the blast furnace at Londonderry, and the prospect of a large demand for the article when the new furnaces are completed, has aroused the attention of the coal owners of Cumberland and Pictou. Some coke was made at Spring Hill and an analysis of it is given; but as it was made of unwashed slack in open heaps, a satisfactory result was not to be expected. An experienced coke burner has been brought out to the Albion Mines from England, to superintend the ovens, and the quality under his management is said to have improved. The analysis shows it to contain very little sulphur, and as it is hard and dense it is an excellent coke. New ovens have been built, the set of eight increased to twenty, and a second set of twenty has been finished. The ovens are the "bee-hive," 11 feet in diameter, and 8 feet high; placed in two rows of ten each, back to back, with railway tracks running over the tops that the ovens may be fed direct from the wagons. The forty ovens will make about 240 tons of coke per week.

ANALYSES OF COKE.

	Albion Mines.	Spring Hill.
Carbon	83.88	81.92
Sulphur	.62	1.52
Ash	14.52	12 90
Moisture	.98	3.66
	100.00	100.00

Hitherto the local demand for coke has been small, and it has increased but slowly. According to the returns the following quantities were made at the several collieries mentioned.

Blockhouse	14	tons
Sydney	65	"
Spring Hill	79	"
Albion Mines	1065	"
	1223	"

FIRE-CLAY.

Good fire-clays are greatly needed, such as will make bricks suitable for stoves, ovens, and furnaces which require refractory linings. The Trade and Navigation Returns show that the Dominion imported in 1873–4, fire-brick to the value of $78,040, and fire-clay to the value of $10,873. Nova Scotia receiving from

	Fire-brick.	$	Fire-clay.	
Great Britain	48,000	936	516 cwt.	272
United States	38,000	1072	.....	.....
Newfoundland	4,000	111	....	....
	90,000	2119	516	272

The Returns for 1874–5 are not copied because they show an abnormal importation, the Steel Company of Canada alone having imported in 1875 about 2,000,000 fire-bricks for their establishment at Londonderry. The works of that Company annually will require large quantities of fire-clay, and for the manufacture of the coke, which their operations will entail, additional quantities of brick and fire clay will be required.

In the measures of the several coal fields there are numerous beds of fire-clay, a few of which have been partially tested, but no systematic search has yet been made. The analyses of three of these clays are given, and, for the sake of comparison, analyses of well known English fire brick and Scotch fire-clays, that prospectors may the more readily know what qualities are to be desired, and what to be avoided. On comparing the analyses it will be noticed that the Nova Scotian clays contain a much larger per centage of alkalies, which are especially detrimental to the quality of a fire-clay. The presence of any quantity of iron and lime is generally injurious; though there are notable exceptions, Stourbridge of the one, and Pease's West Ganister of the other.

ANALYSES OF FIRE-CLAYS.

	Nova Scotian.			Scotch.		
	Lingan.	Deep Seam.	Spring Hill.	Glenboig.	Gartosh.	Glenva.
Silica	55.20	51.15	50.47	60.62	56.94	61.72
Alumina	32.10	22.57	32.69	33.09	35.21	31.17
Iron oxides	1.87	6.48	8.01	4.31	5.11	5.12
Titanic acid	....	1.75	1.88	61	.33	.17
Lime	....	1.27	1.85	63	.95	.75
Magnesia	5.53	1.55	2.11	50	.92	.87
Alkalies	....	2.66	1.96	28	.51	.49
Combined water	5.30	4.23	1.03	....	....	....
Moisture	....	2.88	....	....	....	....
Carbonic acid	....	5.04	....	....	....	....
Organic matter	....	1.16	....	....	....	....

In a late issue of *Iron* there appeared an interesting communication on Firebricks by a Mr. Whitwell, of Stockton, and from it the following information is extracted:

ANALYSES OF SEVEN KINDS OF FIRE-BRICK.

	1	2	3	4	5	6	7
Silica	93.44	80.34	76.76	64.67	61.57	68.00	63.16
Alumina	1.93	17.80	19.40	31.05	30.04	28.25	33.27
Iron, Oxides of	1.87	.32	1.49	3.47	7.57	1.22	1.64
Lime	3.27	.93	1.30	.72	.72	1.31	.50
Magnesia	.31	.45	.64	.67	.73	.90	1.08
Alkalies	.15	.16	.0	trace.	.66	32.	.44
	100.97	100.00	99.59	100.58	101.29	100.00	100.09

Note.—The Iron in 2, 3 and 6 exists are peroxide; in 1, 4, 5 and 7 as protoxide.

(1.) Pease's West Ganister stands for years in Newcastle coke-ovens, watered inside. Would not stand hot-blast, crumbled into dust.

(2.) Half Ganister (Wilton Fire-brick Co.) stands well

in Newcastle coke-ovens. Supports work in Whitwell's hot-blast stoves well—seven years at least without repairs.

(3.) Stourbridge (Perrens & Harrison), stands Whitwell's stoves well; furnace-heaths and linings; fine finish and face on bricks.

(4.) Newcastle (Cowens), excellent for gas retorts; fine skin; not so good as No. 5 for mill-furnace crowns.

(5.) Stands in mill-furnace crowns fourteen to sixteen weeks; neither drops nor melts down.

(6.) Has been much used for blast furnace linings.

(7.) Suitable for the cooler end of Whitwell's stoves.

The chief point to know is, wherein lies the weak point of a brick. One made of the South Durham clay may melt on account of the iron. Another kind without any specks may melt on account of the lime or alkalies it contains. A fire-clay invaluable for retorts may not be so suitable for other uses; take No. 4, which, perhaps owing to the potash, takes a beautiful glaze in the fire and is free from cracks, but it will not stand in a mill-heating furnace so long as No. 5. Again, the protoxide of iron 7.57 in Shipley No. 5, seems to have no effect on its fire-resisting qualities for mill-furnace crowns, and we use these bricks constantly. They are outwardly speckled with iron, and do not hence *look* so clean, though they stand a white heat from fourteen to sixteen weeks. Many bricks will stand a pure flame of coal or gas which will not do for a blast furnace crucible or a puddling furnace flue or bridge jamb."

LIMESTONE.

At many places throughout the country there are kilns for burning lime to supply local demands. For the general requirements, large quantities have been imported from New Brunswick, and Rockland, Maine, where the business of burning lime is conducted on an extensive scale. The Trade and Navigation Returns do not show the quantities imported. Nor does the census of 1871 show the quantity burnt in the Province in that year. It gives the value at only $18,840; and supposing the value of a bushel to be 25 cents, which is a low valuation, the quantity produced in that year was only 75,360 bushels. In 1851, 114,412 bushels; and in 1861, 136,848 bushels were burnt in Nova Scotia. If the figures in the census of 1871 are correct, the importations must be larger. The port of Halifax in 1874, received 10,670 bushels from New

Brunswick, and 5,560 bushels for the United States. It also received 6,000 bushels from domestic ports.

The matter of lime burning has been made a business of at two places in Cape Breton, at the Marble Mountain and George's River, both on the Bras d'Or; and they are likely to successfully compete for the home markets. The enlargement of St. Peter's canal will greatly facilitate the trade. About 9,250 barrels of lime were shipped in 1875, for sale in this and neighboring Provinces. The exports of limestone from this Province are principally, if not altogether, to Prince Edward Island, where the lime is freshly burnt as required. So far as is known, about 4,800 tons were sent there for this purpose in 1875. Pugwash sent 760 tons, and the Marble Mountain, on the Bras d'Or the remainder.

MARBLE MOUNTAIN.

The quarries which have been opened at this locality have exposed immense beds of marble, of which it is proposed, on a future occasion, to make mention. Of late, the owners have confined their attention alone to burning lime from the grey colored marble, near the base of the mountain. An analysis of that variety by Professor How is given.

The company have built two patent draw kilns. They have a cooper's shop and mill for making staves close to the kilns and to the shipping wharf. About 3,250 barrels of lime were made in 1865, some 5,000 in 1874, and 8,000 in 1873, valued at $1.00 per barrel. Twenty-four tons of marble were quarried in 1875 and sent away as samples; and about 4,100 tons of limestone were shipped to Prince Edward Island.

GEORGE'S RIVER

Here also two kilns have been erected, which are capable of burning 85 to 100 barrels of lime per day. During the past season about 6000 barrels were sent to Halifax, Liverpool, St. John's, &c., and were invoiced at 80 cents per barrel. Rockland lime costs, on an average, $1.10 at the kilns, which leaves 30 cents and a margin on freight in favor of the native burnt lime. At this locality there is also a mill for the manufacture of staves, lumber, shingles, &c. The limestone bed is 20 feet thick, and conveniently situated for shipment.

SPRINGVILLE, PICTOU COUNTY.

About half a mile from Springville, on the New Glasgow road, there is a bed of limestone, about 15 feet thick, which is extensively quarried to supply lime for the local demand. It

is very pure, as the following analysis, made at the College of Sciences, Newcastle-on-Tyne, shows, and it is expected that it will be valuable at the proposed iron establishment on the East River.

	Marble Mountain.	Springville.
Carbonate of Lime................. ...	94.31	96.26
Carbonate of Magnesia.....	75	2.33
Oxide of Manganese..................		.55
Oxide of Iron.............. .... }	45	.57
Alumina .... }		.10
Sulphur		.02
Phosphoric acid.........................	decided traces.	.03
Silica..	4.35	1.99
Moisture..................................	14	.17
	100.00	102.02

GYPSUM.

According to the statements kindly furnished by the Custom House officials the following entries show the quantities of plaster shipped to the United States from Nova Scotia during 1875:

Antigonish..............................	925 tons,	$ 925
Baddeck..................	9,905	9,905
Cheverie..................................	15,240	15,240
Hantsport.................................	5,625	5,625
Maitland..................................	3,445	3,445
Walton.....	1,600	1,600
Windsor..................................	57,250	57,250
Halifax.............	880	1,628
Wallace..................................	289	289
	95,159.	95,907

FREESTONE.

The exportation of building stone was considerably reduced, and little or no work was done at the quarries on the Gulf shore. Pictou only shipped 17 tons, valued at $140, to Newfoundland ; Wallace sent 891 tons to Boston, 319 to Newfoundland, 268 tons to P. E. Island, 50 tons to Halifax, and 9 tons to Montreal ; valued at $3 per ton, $4,611. Wallace also exported to P. E. Island 2,083 tons of rubble, valued at 50 cents a ton, $1,041.

At the Lower Cove quarries at the head of the Bay of Fundy, Messrs. A. Seaman & Co., who have hitherto confined their attention to the making of scythe and grindstones, now conmplate shipping ashler also. They have lately built a new

mill, large enough to allow six gangs of saws to be worked. The three that are now set up are capable of taking in blocks of stone 9 feet square by 6 feet thick. This mill is said to be the first in which gang saws have been used for dressing grindstones.

The quarry inland which has been worked of late years, has been, for the present, closed; and the old quarry on the south reef next the shore has been reopened. The largest stone that has been sent from these quarries was lately shipped to a mill at Waterville, in Maine. It was 7 feet 2 inches in diameter, 15 inches on the face, and weighed nearly 8000 lbs.

Messrs. A. Seaman & Co., have reported the following shipments:

To the United States:		
1712 tons of Grindstones	$27,392	
380 gross of Scythestones	1,520	
		$28,912
To Great Britain:		
100 tons of Grindstones	$1,600	
93 gross of Scythestones	372	
		$1,972
In the Dominion:		
150 tons of Grindstones	$2,400	
138 gross of Scythestones	552	
		$2,952
		$33,836

With the increased facilities now enjoyed at these quarries, it is expected the business may be largely extended, and that the trade with Great Britain may be made remunerative.

BARYTES.

Although there are several localities in the country where barytes of fair quality is found, it is alone mined at Five Islands. The quantity exported to the United States in 1875, was 175 tons, valued at $10 a ton.

ACCIDENTS.

The number of fatal and serious accidents to be reported this year is happily small ; wonderful to relate no fatality occurred underground at any of the collieries. It is possible that the action of the Mines Regulation Chapter, bringing home to both managers and men some knowledge of a greater necessity now existing for good discipline, and a more regular system of carrying on mining operations, may, in part, be credited with this satisfactory circumstance. Too much reliance, however, must not be placed on what has been effected, or discipline in consequence be allowed to become relaxed, for an error in management, or errors in individual judgment and purely accidental occurrences, may, at any time, lead to fatal results. A perfect immunity from casualties is not to be expected, for the causes of accident are ever present, and ready to occasion disaster when negligence and recklessness remove control. Strict discipline, constant and systematic attention are essential to reduce even to a low rate, the dangers incident to mining.

Three accidents occurred during the year which resulted in the death of four persons.

I. February 18th, 1875, in the Cross lead gold mine, at Montagu, the fall of some scaffolds occasioned the death of Michael Carrol, aged 35, and John Kennedy, aged 21. The former left a wife and 5 children. The latter was unmarried.

II. March 6th, at the Nova Scotia colliery, Alexander Fraser, aged 47, was crushed on the bank head. He left a wife and 5 children.

III. May 6th, at the Foord Pit of the Albion Mines, Hector Campbell, aged 15, was run over by loaded coal wagons.

Comparing, as in former reports, the mortality with the business at the collieries, one life was lost for every 390,582 tons raised, and for every 1,888 persons employed about the coal mines.

Explosions of Gas.—Eight explosions of gas which resulted in injuring ten men, have been reported. Taking them in the order of their occurrence. The first happened on the 3rd of February to Hugh Bunt, who was engaged in driving a headway in the Foord Pit. Before going to work on the morning of the 3rd he was warned by the examining deputy that a little gas was showing in his place. On going in he put his safety

lamp up to try for the gas, when it fired and burnt him slightly. A careful examination of the lamp, a Clanny, showed that the glass did not fit close, and that probably the flame was driven out under it. It is said that every care is taken with the lamps, and that they are daily examined by the shot-firers at the stations before the men are allowed to go inbye ; certainly they have every appearance of being well looked after. Yet this accident shows that where they are used and trust put in them, too much attention cannot be paid to the condition in which they are kept.

In a former part of this report under the heading INTERCOLONIAL COLLIERY, reference was made to the second explosion which merely slightly burnt the man who set fire to the place.

The third explosion happened at the Vale Colliery on the 22nd of June. William Hyde, a fireman, reported a little gas in a heading and told McPhee, the cutter, to keep away until he had brushed it out. McPhee, however, with a naked light on his head, followed too closely in and fired the gas, which burned them both, but not seriously.

The fourth took place at the Nova Scotia Colliery, also in a heading, on the 28th of the same month. Two men were driving up from the water bord to the main level above, a distance of 40 feet. They were within six feet of holing through, when they dismissed the boy who worked the fan by which the air of the place was kept pure, and going to the level above worked frcm the upper side. While so engaged some little gas must have collected in the place below ; for on a bore hole being put through and a light applied to the hole, gas fired and Henry Devine, who had gone round and was in the place below got slightly burned.

The fifth case occurred at the Sydney Mines, also in a heading, on the 22nd of July. Donald Lammond and his partner when driving a heading to the rise struck a " roll" or "swelly" in the roof and with it a small blower of gas. Instead of informing the deputy, they went on filling several tubs of coal and thought little of the gas until it began to accumulate at the face. Then proceeding to brush it out with their jackets it ignited at Lammond's lamp, and burnt him about the neck and arms.

The sixth explosion of gas happened at the Vale Colliery, on the 7th of August, by which two Frenchmen were slightly burnt about the face. They went into a place where they had no business to be and where "danger" boards were up. This and other warnings not being sufficient to bring home to the

body of the men the necessity of complying with the rules of the colliery, the manager wisely prosecuted two other men who subsequently exposed themselves under somewhat similar conditions, and they were fined by the magistrate.

The seventh case occurred at the Acadia colliery on the 3rd of September. A French miner, named Casimer Martin, who had lately been working in the pit, but was then employed elsewhere, entered the pit without permission, or the knowledge of the deputy in charge, to look for some missing tools. He went into a short heading which had been standing for a few days, the pit not then working, and with his naked light ignited some gas that had accumulated. He was rather badly burnt, and being alone had some difficulty in making his way out. An action in the courts is now pending against him. The Mines Regulation Chapter only applying to workmen does not contemplate such a case, where a man, not at the time a workman, effects an entrance into a pit and exposes himself and others to danger. The action has been brought under some Dominion statute.

The last explosion reported happened at the Victoria colliery to John McJaggart, the fireman, whose dnty it was to inspect the places and see that all were safe before the workmen entered. On the 4th of December he neglected to take his safety lamp with him, confident from long immunity that no gas collected, but he found with his naked lamp sufficient to punish his negligence.

Explosions of Powder.—Three accidents are reported to have happened from this cause in coal pits. One from a man returning too soon in front of a charge that he thought had misfired, another from the stemming of loose powder, and the third from the fall of a lighted squib into a can of powder. The last shows the value of the rule which restricts the quantity of powder which shall be permitted to be kept at any one time in one place. The quantity yet allowed, 6 lbs., is quite sufficient in such a case of reckless handling to cause serious, if not fatal injuries.

One accident is reported to have occurred with dynamite in a gold mine. The miner, Edwards, who was injured was reported to have been picking out the stemming from a hole that had missed fire (contrary to the General Rules and to his orders) and a small stone falling in he endeavored to break it with an iron scraper when the charge exploded. Luckily for him the force of the explosion was expended in

shattering the rock, and he received no very serious injuries. Other and minor accidents were imputed to dynamite, but an enquiry in all cases showed that they were due, not to dynamite, but to the detonators, which should be carefully handled, as they are heavily charged with a highly explosive fulminate. They should always be carefully put away, and especially out of the way of children.

EXPLOSION OF A STEAM-BOILER.—On the 22d of November, about 1 A. M., one of the steam-boilers in the slope engine house, at the Blockhouse Colliery exploded, and severely scalded the fireman, who was the only person in the building at the time. The manager in reporting the accident states, that "the fireman allowed the water to get too low, and in the act of feeding the explosion took place." Accidents from this cause can only be prevented by the selection of careful men to act as enginemen and stokers, for the best of boilers are liable to explode under such circumstances. As a general practice throughout the Province there is not that care of steam-boilers that there should be. I have had not only to call attention to extra weights hung on the levers of *safety* valves to prevent them from blowing off steam at double the working pressure, but actually to threaten a prosecution under the Chapter, unless the evil was remedied, and the valves were made what they pretended to be, safety valves.

FALLS OF COAL AND STONE.—Three cases of serious injury resulting from falls of coal and stone, were reported. The first occurred at the Reserve pit, on the 23rd of April, and was due to the collier, who was injured, not taking sufficient care when picking down a fall of coal that a shot had failed to dislodge.

The second happened to a collier at the Gardiner pit from the fall of a "caldron bottom," from the roof. Several fatal accidents have been occasioned by falls of stone from such pot holes, as they are not readily distinguishable; and a roof subject to contain them requires more than ordinary watching.

The third accident reported under this heading occurred at the Sydney Mines in October, and was precisely similar in character to the one noticed above as having taken place at the Reserve pit.

ACCIDENTS IN SLOPES.—On the 27th March, Henry Richart was seriously injured, at the Nova Scotia colliery, through his wilful disobedience of orders; and had his in-

juries been less severe than they were, he would have been prosecuted for his misconduct. The coal from the bottom of the new lift was raised to the main level above, by an engine in the pit, and the empty tube lowered by a brake on the drum of the engine, which, for the time, was thrown out of gear. Richart, who was employed as a loader at the bottom, got on the tub to ride down, which, as he knew, was strictly forbidden. The brakesman three times stopped the tub in its descent, and ordered him off, but his warnings were without effect. Then, as it happened, the brake lever broke, and Richart went to the bottom of the slope with the tub.

A boy at the foot of the slope was struck by the tub, and had some of his ribs broken. He had been strictly ordered, so it is said, only the day before, to leave the bottom of the slope immediately after shifting the points, which is done as the tub leaves the bottom, and without exposing the pointsman. A bench had also been placed for the boy in a safe position. On one of the men at the bottom hearing the tub coming, he seized the boy to drag him out of the way, but he getting frightened ran in front of the tub and so got injured.

An accident took place at the Vale colliery which nearly proved fatal to Alex. Killock the pit stableman, on the 18th of October. He attempted to jump on the ascending rake in the slope, and, missing his hold, fell so that his leg got entangled under the front tub of the rake, and by it he was dragged some fifty feet. His leg was broken in two places, and he was fortunate in escaping with his life. A man was fined $4 but a short time before, at that colliery, for disobeying orders and getting on the rake when in motion.

Accidents in Shafts.—Under this head only one accident at a colliery has to be noticed. It happened at the Lloyd's Cove pit of the Sydney Mines, to Samuel Hudson. There had been occasion to remove a portion of the temporary scaffolding at the seam, and Hudson himself took up the planks. By a strange forgetfulness when about to ascend, he stepped forward over the vacant place and fell through to the sump, a depth of about 20 feet, breaking an arm and cutting his forehead; from which injuries he ultimately recovered.

On the 31st of July, a man, contrary to orders, got on the top of the wagon ascending the inclined shaft, at the Wellington gold mine at Sherbrooke, and he was severely crushed by coming between the wagon and the heavy cap

piece at the shaft mouth. His injuries were severe but did not prove fatal, as from the character of the accident it was at first feared they would.

MISCELLANEOUS.—All the four fatalities that happened during the year have to be reported under this head. Two of which occurred in the gold mine at Montagu, worked on the Cross lead. On the 18th of February when the night shift were down a scaffolding on which was piled some ten feet of stone fell fifty feet to the next scaffold, thirty feet from the bottom, and carrying with it the lowest and new scaffold, crushed the two men Michael Carroll and John Kennedy who were working below. The mine had been let to tributers the previous autumn, and they had strengthened the timbering as they thought sufficient for their own safety. The mine had not been open for five years, and when I was in the district during the previous autumn it was then being retimbered, and the water being high prevented an entrance. It seems that when the mine was previously worked the scaffolds had not been fully stowed with the debris, so that when the upper one gave way it fell with great force and carried with it the two lower. As the lowest had been strengthened with new stull pieces it was thought secure; but the intersection of the two leads making the stope for about 30 feet in length, 8 feet wide, and the mine being vertical, the scaffold fell with great force. The cause of the giving way of the scaffold is not very evident. It was thought, however, that the previous steady and severe cold weather might have formed ice, and on a thaw occurring occasioned the fall. Whatever was the cause the accident shows the necessity of stowing the scaffolds full of the debris, that when the timbers decay, or from any cause give way, no severe shock may, by a movement above, be given to the timbers below. It is seldom possible to examine and strengthen abandoned scaffolds, except at great expense, and the precaution of stowing full should be especially taken in vertical mines.

The other two fatalities occurred on the surface at two of the collieries in Pictou County. The first happened on the 6th March, at the Nova Scotia colliery. Alexander Fraser was one of the banksmen, and his duty was to unhook the chain from the tubs at the head of the slope. On the day in question he had cast off the chain and stepped off the tub, and was standing with his back to the rake when his clothing was caught by the key of the cross bar of the third tub, and before he could disentangle himself he was carried

forward and crushed against the post of the door by which the tubs go out of the bank house. He had the misfortune some years before to lose his left hand, and an iron hook did in part do duty for it, which probably made it the more difficult for him to disentangle himself.

The second happened at the Albion Mines. Hector Campbell, a lad of 15 years of age, was one of the drivers engaged in removing the loaded wagons from the screens at the Foord Pit. On the 6th of May when so engaged, he by some means, not known, slipped, and was run over by the wagons.

Three serious, but not fatal, accidents were reported from other collieries. In two cases men had their legs broken by being run over by tubs in the pits. In the third, a boy got squeezed between two tubs by riding on the rake on an incline, contrary to the orders of the colliery.

I have the honor to be,

Sir,

Your obedient servant,

HENRY S. POOLE

The Hon. Robert Robertson,
Commissioner of Public Works and Mines.

LIST OF COAL LEASES IN THE PROVINCE.

No.	Lessee.	Colliery.	Area Sq. Miles	Working.	Agent and *Manager*.	Postal Address.
		ANTIGONISH COUNTY.				
1	McKinnon, et al		3			
		CUMBERLAND COUNTY.				
13, 14, 15	Black, C. H. M.		3			
21	Blight, James, et al		1			
11	Bradley, Benj		1		John Moffatt	River Hebert.
25	Campbell, Alex., et al		1			
32, 34	Campbell, Alex., et al		2			
35	Campbell, Alex.		1			
31, 33	Campbell, John		2			
12	Cumberland C. M. Co.		4			
17	Domville, James		3		E. N. Sharp	St. John, N. B.
	General Mining Association		4		John Rutherford	Halifax.
	Joggins C. M. Association	Joggins	2	working.	B. B. Barnhill *Robert Redpath.*	Joggins.
	Joggins C. M. Co	Cumberland	2	working.	Alex. Barnhill.	Joggins.
20	Kirby, Lewis R.		1			
18, 19	Livesey, John		2			
5	Lawson C. M. Association	Maccan	1	working.	William Bennett	Maccan.
1, 2, 3, 4	New York & Acadia Co	Scotia	4			
16	Seaman Gilbert		1			
24	Shannon, S. L.		2	working.	*William Hall*	Spring Hill.
6, 7, 8	Spring Hill Mining Co.	Spring Hill	3		J. S. Hickman.	Amherst.
22, 23, 28, 29, 30	Styles Mining Co. [Limited]		5			
9	Victoria Coal Mining Co.		2			

LIST OF COAL LEASES IN THE PROVINCE.—(*Continued.*)

26, 27	Wright, John V........................		3			
			51			
		PICTOU COUNTY.				
1	Acadia Coal Company...........	Fraser	1		Jesse Hoyt...............	Stellarton.
3	" " "	Acadia.	1	working.		
19, 21, 22	" " "	Pictou...............	4			
23	Allan, Sir Hugh, Kt.............	Vale	3	working.	J. B. Moore............ / *John Greener*	New Glasgow
11	Haliburton, R. G. et al.........	....	1			
	Halifax Company, (limited)......	Albion	4		S. Cunard & Co .... / *James Hudson*.........	Halifax. / Stellarton.
13, 14	Intercolonial Company............	... .	2			
12	" "	Drummond	1	working.	James Simpson	Westville.
6	Kirby, Lewis R.....	....	1			
15, 30, 31	Merigomish Company..............	....	3			
10	Montreal and Pictou Company..	....	1			
25	Nova Scotia Company............	Black Diamond.............	4	working.	W. W. White..	Westville.
20	Price, D. E., et al........	....	2			
24	Richey, M. H.................	....	1			
			29			
		CAPE BRETON COUNTY.				
3	Archibald, Blowers.......... ..	Gowrie................	1	working.	Archibald & Co..... / *Charles Archibald*....	North Sydney. / Cow Bay, C. B.
2	Archibald, Thos. D..............	"	1			
5, 28	Blockhouse Mining Co.'y	Blockhouse	2	working.	W. Macqueen....	Cow Bay, C. B.
29	" " " (sea area).	....	1			

LIST OF COAL LEASES IN THE PROVINCE.—(*Continued.*)

72	Brookman, Samuel		1			
76, 77	" S, et al.		2			
15	Caledonia C. & B. Co	Caledonia	1	working.	David MacKeen	Little Glace Bay.
31	(*sea area*)		1			
30	Campbell Alex		1		T. D. Archibald	North Sydney.
23, 25, 70	Cape Breton Co. [Limited]		3		Edgar Stirling	Sydney.
8, 9	Clyde Coal Mining Co	Ontario	1½	working.	*John Sutherland*	Port Caledonia.
66	Gardiner Coal Mining Co	Gardiner	2	working.	William Routledge	Bridgeport.
	General Mining Association	Bridgeport	2		John Rutherford	Halifax.
	" " "	Sydney	5	working.	*Richard H. Brown*	Sydney Mines.
	" " "	"	12		Cunard & Morrow	Halifax.
27	" (*sea area*)	"	5			
	" " "	Lingan	10	working.	*Donald Lynk*	Lingan.
	" " "	"	4			
38	(*sea area*)		5			
39	(*sea area*)		5		E. P. Archbold	Halifax.
4, 12, 16	Glace Bay Mining Co	Glace Bay	3	working.	*Henry Mitchell*	Little Glace Bay.
49	Glasgow & C.B.(N.S.)C.& R. Co	Reserve	1	working.	Edgar Stirling	Sydney.
75	Henry, W. A		1			
22	Ingraham R. J. & J. L.	Halfway	1			
6, 13, 18, 19	International C. & R. Co	International	4	working.	R. N. McDonald	Bridgeport.
71	Jennings Edward		1			
47	LeCras & McInnes		1			
64, 65	Lorway Coal Co	Lorway	2		Edgar Stirling	Sydney.
68	" "		1			
69	" "	Emery	1	working.	Edgar Stirling	Sydney.
10, 21	Matheson J.		2			
74	Moore & Moseley		1½			
81	Morton, Lemuel J.		1			

LIST OF COAL LEASES IN THE PROVINCE.—(*Continued.*

80	McDonald, James		1			
52, 53	McLeod, Hugh		2			
73	Reid, Thos S., (sea area)		1			
40, 41, 42	Ross, H. E., et al		3			Point Aconie.
79	Ross, Walter J., et al. (sea area)		1			
14, 24	Schooner Pond Coal Co	Schooner Pond	2		Edgar Stirling	Sydney.
43	South Head Coal Co	South Head	1	working.	*James Baird*	Cow Bay.
32	Sword, Wm., estate of (sea area)		3			
54 to 63	Sydney C. M. Co. (sea areas)		10		S. N. Robinson	
46	Todd, A Thornton	Collins	1	working.	*George Scott*	Little Bras d'Or.
67	Weatherbe & Kirby		1			
78	Weatherbe, Robt. L. (sea area)		5			
34, 35, 36	Victoria C. M. Co., (sea area)	Victoria	5	working.	Joseph Salter	Low Point
50, 51	" " "		2			
			123¾			
		INVERNESS COUNTY.				
5	Evans, John Aylmer Freke	Cape Mabou	2			
8	Evans, Thomas	Chimney Corner	1			
9	" " (sea area)		1			
13	Murray, George	Port Hood	3	working.	John P. Lawson	Port Hood.
12	McCully, Jona, et al		1			
4	Richey, M. H., et al		1			
11	Ross, W. J	Broad Cove	1			
6	Ross, H. E., et al, (sea area)		1			
7	Ross, H. E., et al		1			

LIST OF COAL LEASES IN THE PROVINCE.—(*Continued.*)

10	Tremain, E. D., (sea area)......		1			
			13			
		RICHMOND COUNTY.				
2	Marmaud, A. E	Little River...............	1			
		VICTORIA COUNTY.				
2	Cambell, Charles J..	New Cambellton.........	3	working	John Macdonald.......	New Campbellton.
3, 4, 5	Ross, William	.. ..	5			
			8			

Total area under lease................ $228\frac{3}{4}$ square miles.

COAL TRADE BY COUNTIES.

TABLE A.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		1874.
	Raised.	Sold.	Raised.	Sold	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Sold.
1st Quarter...........	12,097	10,293	80.612	17,961	55,438	3,534	....	....	148,147	31,788	35,052
2nd Quarter...........	13,530	12,335	90,692	76.467	87,090	71,173	1,521	1,446	192,833	161,421	190,149
3rd Quarter...........	17,606	17,452	124,186	162,780	111,555	146,629	1,888	1,293	255 235	328,154	346,688
4th Quarter...........	21,564	20,864	87,172	79,894	74,312	83,366	1,872	1,308	184,950	185,432	177,238
Total.........	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795	749,127
1874.........	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127	749,127
1873	27,592	26,345	383,949	333,984	639,085	520,189	841	588	1,051,467	881,106	881,106
1872	15,750	14.153	422,716	388,417	437,326	380,274	5,158	3,070	880,950	785,914	785,914

COAL TRADE BY COUNTIES.

TABLE B.

MARKETS.	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack	
Nova Scotia—											
Land Sales	3373	1957	34063	12421	3314	2474	116	....	40866	16852	57718
Seaborne	98	3	49509	6562	91801	4235	2704	....	144112	10800	154912
Nova Scotia—Total	3471	1960	83572	18983	95115	6709	2820	....	184978	27652	212630
Quebec	....	....	144221	3930	41017	160	426	....	185664	4090	189754
New Brunswick	45716	8969	5359	1793	23911	220	....	....	74986	10982	85968
Newfoundland	....	....	3658	237	57412	240	801	....	61871	477	62348
P. E. Island	....	....	10888	26187	5930	636	....	....	16818	26823	43641
United States	828	....	26199	5421	47818	9480	....	....	74845	14901	89746
East Indies	....	....	....	....	1003	....	....	....	1003	....	1003
West Indies	....	....	4633	....	11796	....	....	....	16429	....	16429
South America	....	....	2021	....	2758	....	....	....	4779	....	4779
Great Britain	....	....	....	....	497	....	....	....	497	....	497
Total	50015	10929	280551	56551	287257	17445	4047	....	621870	84925	706795
" 1874	40492	9107	302341	55585	312310	24706	4538	48	659681	89446	749127
" 1873	23944	2401	281641	52343	504281	15908	488	100	810353	70753	881106
" 1872	13272	881	340142	48275	360036	20237	2879	191	716329	69584	785914

COAL SALES.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year. 1875.	1874.
Nova Scotia.........						
" Land Sales.	18.824	10.046	7.823	21.025	57.718	61.646
" Seaborne ...	2.356	37.812	72.458	42.286	154.912	153.319
Total............	21.180	47.858	80.281	63.331	212.630	214.965
Quebec	....	48.549	116.526	24.679	189.754	162.269
New Brunswick....	8.561	19.081	29.642	28.684	85.968	78.841
Newfoundland	634	12.110	29.833	19.771	62.348	55.696
P. E. Island.........	....	8.822	23,086	11.733	43.641	41.948
United States,......	123	20.316	44.542	24.765	89.746	138.335
East Indies.......	....	1.003	....	....	1.003	....
West Indies.........	1.290	1.228	3.151	10.760	16.429	47.844
South America......	....	2.059	991	1.729	4.779	5.077
Great Britain.......	....	395	102	....	497	4.152
Total............	31,788	161.421	328,154	185,432	706.795	749.127
1874.	35.052	190,149	346.688	177.238	749,127	749.127
1873.	38.231	188.392	414.434	240.049	881.106	881.106

COAL.—GENERAL STATEMENT.

1875.	Produce.	Sales.	Colliery Consumption.
1st Quarter.......................Tons.	148.147	31.788	30,372
2nd " .... "	192.833	161.421	30,009
3rd " .... "	255.235	328.154	31,376
4th " .... "	184.950	185.432	32,353
Total.......................1875	781.165	706.795	124.110
Total 1874	872.720	749.127	119.582
Total.......................1873	1.051.467	881.106	108.398
Total.......................1872	880.950	785.914	101.341

NOTE.—Stocks on hand at the end of the year, 58,000 tons.

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31st, 1875.

Collieries.	Seams.	Produce.	Sales. Bearing Royalty.	Sales. Free.*	Sales. Total.	Per Centage.	Colliery Consumption. Engines.	Colliery Consumption. Workmen.	Per Centage.
CUMBERLAND COUNTY.									
Cumberland,		336	180	....	180	53	120	....	..
Lawrence,	Joggins,	60	35	25	60	100	...	....	..
Seaman, G.		528	132	396	528	98	....	....	..
Scotia,	North,	1460	1423	117	1540	105	250	....	17
South Joggins,	Joggins,	11968	10857	731	11588	97	900	182	9
Spring Hill.	Black,	50505	37388	9660	47048	93	2346	1021	6
PICTOU COUNTY.									
Acadia,	Acadia,	65992	49824	12159	61983	93	4270	1952	9
Albion Mines	Deep,	46948	98297	17191	115488	81	17536	4559	16
	Main,	90121							
Intercolonial,	Acadia,	72016	51790	7462	62252	86	2373	8121	11
Mitchell & Co,	McBain,	214	200	34	234	109	....	....	..
Nova Scotia,	Acadia,	60824	39946	10432	50378	82	5573	1768	12
Vale,	McBain,	46547	37494	9273	46767	100	1388	1163	4
CAPE BRETON COUNTY.									
Blockhouse,	Blockhouse,	23064	21904	250	22154	96	2400	1864	16
Caledonia,	Phelan,	16566	10478	2256	12734	76	799	659	9
Collins,	Collins,	662	252	138	390	58	120	64	27
Emery,	Emery,	8356	6113	312	6425	76	2720	681	40
Gardiner,	Lorway,	10400	10995	385	11380	109	3580	572	39
Glace Bay,	Harbor,	22734	25085	712	25797	113	737	988	7
Gowrie,	McAuley,	23924	24391	6743	31134	130	2610	3041	23
Ingraham,	Indian,	150	150	....	150	100	....	....	.
International,	Harbor,	40489	41961	....	41961	103	1180	1808	6
Lingan,	Lingan,	22885	22536	3137	25673	114	3827	1605	23
Ontario,	Phelan,	5653	5380	46	5426	96	63	238	6
Reserve,	Phelan,	9493	10273	1479	11752	123	1828	735	27
Schooner Pond,	Emery,	....	1365	293	1658	..	67	13	..
South Head,	Spencer,	1116	539	....	539	48	17	96	9
Sydney Mines,	Lloyds,	2295	92014	815	92829	74	25565	7200	26
	Main,	121904							
Victoria,	Ross,	18814	13821	879	14700	73	2778	2030	25
INVERNESS COUNTY.									
Port Hood,		720	315	....	315	43	180	38	30
VICTORIA COUNTY.									
New Campbellton,		4561	3732	....	3732	81	558	156	15
		781,165	621,870	84,925	706,795	90	83,534	40,576	15

*Free Coal.—Chap. 9, Sec. 106, (a). "Slack Coal, that is, Coal that shall have passed through a screen, the bars of which are not wider apart than three-quarters of an inch.

Note.—The extraordinary per centages of sales to quantities produced, suggest that the quantities returned are under estimated. Deducting the stock on hand at the close of 1875, from the stock at the end of 1871, the difference 35,000 deducted from the total quantities sold and consumed at the collieries makes the produce of 1875 about 706000 tons or 15000 tons more than the above estimate.

Statement of the number and classes of persons employed, and average results at each colliery, during the year ended December 31st, 1875.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Ave. No. of days per person.		Average No. of tons per Cutter.	Average tons per day per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cut'rs	Laborers.	Boys.	Days Labor	Mechanics.	Laborers.	Boys.	Days Labor	Pers's	Days Labor	Per's	Days Labor	Und'r gr'nd	Surface.				Above	Below	Days.
Cumberland,	8	...	...	1069	4	6	2	984	9	916	29	2969	133	82	42	...	.....	1	...	143
Lawrence,	1	1	...	76	...	...	...	.....	...	.....	2	76	38	.....	60	...	......	...	...	38
Scotia,	6	2	1	1232	2	2	1	1177	3	85	17	2494	136	235	243	1.7	10	1	...	142
South Joggins,	24	3	9	7386	8	7	2	5965	1	26	51	12477	34	298	496	2.7	65	6	6	182
Spring Hill Mining Co.,	73	24	10	28862	19	38	4	15909	10	1797	178	46568	269	261	692	2.5	182	3	4	277
Acadia,	95	27	20	31216	27	66	5	24692	.	.....	240	55908	220	252	695	3.2	305	15	5	216
Albion Mines,	273	62	69	83674	47	118	38	61388	...	.....	607	145062	207	302	502	2.5	Ds 272 Ms 417	22	32	Ds 186 Ms 216
Intercolonial,	84	34	18	31686	29	49	15	27508	69	5255	298	64449	233	295	857	4.9	327	8	2	220
Mitchell & Co.,	3	2	1	265	...	1	...	68	...	......	7	333	44	68	74	1.4	5	...	1	38
Nova Scotia,	78	25	14	34141	13	39	7	17947	...	......	176	52388	297	304	780	3.2	250	5	5	243
Vale,	124	28	41	33645	27	37	5	16205	15	1705	247	51555	206	234	375	1.7	219	3	5	212
Block House,	45	5	20	9670	19	20	4	8893	...	......	113	18563	138	207	512	4.0	181	9	13	127
Caledonia,	32	3	9	7034	12	19	3	5953	...	......	78	12987	160	175	517	4.6	149	10	7	111
Collins,	6	9	1	1696	...	10	1	1361	5	151	32	3908	106	123	110	2.6	15	1	...	42
Emery,	39	1	11	4897	13	13	3	4331	...	......	80	9228	96	150	214	4.5	177	5	5	47
Gardiner,	41	2	7	3425	5	8	2	1632	...	......	65	5057	68	109	254	1.6	65	5	2	158
Glace Bay,	42	5	19	11847	16	12	3	6980	14	1631	111	20458	179	225	541	2.8	118	11	14	192
Gowrie,	60	10	18	15210	19	25	13	12252	...	......	145	27462	173	215	398	2.9	176	8	12	136
Ingraham,	2	...	1	150	1	...	...	60	11	188	15	398	50	60	75	1.4	......	1	...	45
International,	63	8	14	18443	13	23	3	12422	2	133	126	30998	216	318	643	3.3	213	10	12	190
Lingan,	49	8	14	14952	...	33	9	11644	...	......	113	26596	210	277	465	3.2	160	7	12	142
McInnis & Le Cras,	...	...	...	....	4	...	...	230	...	......	4	230	.....	57	.....	...	......	1	...	30
Ontario,	24	...	2	2921	3	15	2	2876	...	.....	46	5797	112	143	235	1.6	39	2	2	145
Reserve,	50	1	15	5919	13	10	5	4479	...	......	94	10398	90	160	190	3.9	182	8	11	52
Schooner Pond,	...	...	...	......	7	13	1	418	...	......	21	418	.....	20	.....	...	......	1	...	......
South Head,	10	8	4	584	2	2	2	335	17	1341	45	2260	26	56	112	2.6	26	1	...	43
Sydney Mines,	221	55	100	88321	61	85		50293	91	25166	640	163780	235	291	562	2.3	Ms 493 Ls 15	25	68	Ms 247 Ls 151
Victoria,	49	20	4	9656	10	18		7485	...	......	104	17141	132	241	384	2.2	110	2	1	171
Port Hood,	6	3	2	1313	2	3		1280	5	700	25	3293	119	142	120	0.8	4	2	...	157
New Campbellton,	22	6	3	4247	6	9	4	2974	15	111	65	7332	139	156	207	1.4	31	4	...	144
	1530	352	397	453837	382	681	168	306841	267	39205	3777	799883	194	249	510	3.2	191	177	219	136

COLLIERY CONSTRUCTION ACCOUNT.

COLLIERIES.		Shafts.	Slopes.	Adits.	Machinery.	Colliery Build'gs.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospecting.	Total.
Cumberland,	Cumberland Co.	975 00	2120 00		3650 00	2200 00	500 00	250 00	1110 00	300 00	200 00	11305 00
Lawrence			25 00									25 00
Scotia				235 00								235 00
South Joggins			562 00		1650 00							2212 00
Spring Hill				5812 00	10500 00	990 00	2400 00	127 65	876 32		28 70	20764 67
Acadia,	Pictou Co.				3499 71	58 58	1241 35	27 30				4826 97
Albion Mines					259 67	1122 83	9381 48	*18072 99				28836 97
Intercolonial			8573 41	1457 95	6683 89	8010 10		1828 16	441 37			26994 91
Nova Scotia			400 00	4515 00		690 00			5082 00	355 00	330 00	11402 00
Vale		633 00			12896 00	1700 00			470 00	904 00		16603 00
Block House.	Cape Breton Co.											
Caledonia				183 06			56 97	240 17				480 20
Collins			463 61	66 83	1119 98	233 70	63 60	200 00	260 11	384 80		2792 63
Emery			78 60	267 23	500 00							845 83
Gardiner												
Glace Bay		2015 98					664 62					2680 60
Gowrie		1792 09		509 00		200 00	250 00					2751 00
Ingraham												
International		60 00	141 38	274 28	200 00							675 66
Lingan				466 60	4922 00							5388 60
McInnis and LeCras		40 00	30 00				25 00				360 00	455 00
Ontario				135 29	990 00	27 50		150 00				1302 79
Reserve			111 63	145 63	250 00							507 26
Schooner Pond												
South Head			27 50	33 80	72 25	60 20	205 27		77 32	2660 43		3136 77
Sydney Mines		5313 02					24 87	1076 97	5503 11	4420 44		16338 41
Victoria										400 00		400 00
Port Hood,	Inverness Co.		1620 00	556 00	3190 00	660 00	2726 00					8752 00
New Campbellton.	Victoria Co.			5747 68	375 00	497 00		100 00	70 00	182 00		6971 68
		10829 00	14153 16	20465 35	50758 53	16449 91	17539 16	22073 24	13890 23	9606 67	918 70	176683 95

* 15956 31. New Coke Ovens.

EXPORTS OF COAL FROM GREAT BRITAIN, UNITED STATES AND NOVA SCOTIA.

	Great Britain 1871.	UNITED STATES, 1874-75.			Nova Scotia. 1874-5.
		Bituminous.	Anthracite.	Total.	
Great Britain	*				1117
Russia	883435				
Sweden	600270				
Norway	319283				
Denmark	662289				
Germany	2056881				
Holland	417142				
Belgium	229195				
Channel Islands	62399				
France	2281409				
Portugal, &c	229108		10	10	
Spain, &c	544319				700
Gibraltar	139071				
Italy	909363				383
Austrian Territories	84389				
Malta	312194				
Greece	79306				
Turkey, &c	321870				
Egypt	617578				
Algeria, &c	30088				
West Coast of Africa	76930	150	124	274	
British Possessions South Africa	47270				
Eastern Coast of Africa	11888				

EXPORTS OF COAL FROM GREAT BRITAIN, UNITED STATES AND NOVA SCOTIA. *Continued.*

Mauritius	16644				
Arabia, &c	149435				
British India	644607				1003
Java, &c	59338				
Philippine Islands, &c	2176				
China and Hong-Kong	55236		4831	4831	
Japan	8199		1339	1339	
Australia	15826		416	416	
Islands in the Pacific	247	68	2975	3043	
British North America	186753	140237	266329	406566**	381711‡
United States of America					
Atlantic	39777	†	†	†	120416
Pacific	71902				
British West Indies	133391	2577	778	3355	11346
Foreign West Indies	289246 (with Cuba)	7132	1048	8180	26963
Cuba		33005	21313	54318	2814
Mexico	2152	3124	4118	7242	
Central America	1718	1	36	37	
United State of Columbia	5470	14107	11078	25185	
Venezuela, &c	1616	30	25	55	
Peru, &c	127156		50	50	
Chili	210753	1220	235	1455	
Brazil	382584	1189	1229	2418	527
Uruguay, &c	267108	249	222	471	4779
	13617311	203089	316156	519245	551959

‡This quantity does not include the Sales and Colliery consumption in Nova Scotia, which amounted to 336,740 tons in 1875. *The home consumption in Great Britian, is computed at 112,450,605 tons. **Valued at 2,029,903 dollars, to which must be added, according to Canadian reports, coal of the value of $500,979. †The home consumption in the United States, is computed at 45,000,000 tons, of which 21,000,000 were Anthracite, 28,000,000 Bituminous, and 1,000,000 Lignite.

Coal Sales in Nova Scotia from 1785 *to* 1875 (*Inclusive.*)

Year.	Sales.	Total.
1785	1,668	
1786	2,000	
1787 1788 1789 1790	10,681	14,349
1791	2,670	
1792	2,143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	70,452
1811	8,516	
1812	9,570	
1813	9,741	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	91,527
1821	11,388	
1822	7,512	
1823 1824 1825	27,000	
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	140,820

Year.	Sales.	Total.
1831	37,170	
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145,962	
1840	101,198	839,981
1841	148,298	
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	2,399,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576,935	
1865	635,586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	4,927,339
1871	596,418	
1872	785,914	
1873	881,106	
1874	749,127	
1875	706,795	3,719,360
	Total, -	13,788,503

SUMMARY.

1785 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1875	3,719,360

NOTE.—Tables purporting to show the total quantity of coal produced in Nova Scotia have been, from time to time, published, but in all errors of greater or less magnitude have crept in as the different valuations given to the chaldron in the several sections of the country have been overlooked. The above table is probably as nearly correct as can now be determined, and if 13 per cent. be allowed for colliery consumption, 1,792,505 tons must be added making the total quantity actually raised, 15,581,008 tons.

MISCELLANEOUS NOTES.

PORT OF HALIFAX.

Exports of Minerals :—

	1874		1875	
Coal	7615 tons	$30963	1850 tons	$7336
Gypsum	330 "	594	880 "	1628

Imports of Coal :—

	1874	1875.
United States	4494 tons	5119 tons.
Albertite	585 "	387 ? "
Coast wise	110418 "	123200 "

PORT OF ST. JOHN'S.

Imports of Coal :—

	1873	1874	1875
United Kingdom	Tons, 7075	7732	10615
Nova Scotia	" 40220	29863	48645
United States	" 348	268	583

THE DOMINION IMPORTED 1874-5.

COAL AND COKE.

From

	Tons.	$
Great Britain	139300	551317
United States	512835	2524771
Newfoundland	110	330
	652545 tons	$3076418

THE PROVINCES OF THE DOMINION IMPORTED 1874-5.

	Great Britain. Tons.	United States. Tons.	Newfoundland. Tons.
Nova Scotia	1131	5548	
New Brunswick	7141	16546	
P. E. Island		54	
Quebec	131307	106332	110
Ontario	9	384169	
Manitoba	10	112	
British Columbia	2	74	

GOLD.

GENERAL ANNUAL SUMMARY.

YEAR.	Total ounces of Gold extracted.			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average earnings per man per day and year, at 300 working days, and $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A day.	A year.
1862	7,275			6,473	1	2	11	156,000	$0 83	$249
1863	14,001	14	17	17,002		16	11	273,624	92	276
1864	20.022	18	13	21,434		18	16	252,720	1 42	426
1865	25,454	4	8	24.423	1	0	20	212,966	2 15	645
1866	25,204	13	2	32,161		15	2	211,796	2 14	642
1867	27,314	11	11	31,386		17	9	218,894	2 24	672
1868	20,541	6	10	32,262		12	17	241,462	1 53	459
1869	17,868	0	19	35,147		10	4	210,938	1 52	456
1870	19,866	5	5	30,829		12	21	173,680	2 05	615
1871	19,227	7	4	30.791		12	11	162,994	2 12	636
1872	13,094	17	6	17,093		15	7	112,476	2 09	627
1873	11,852	7	19	17,708		13	9	93,470	2 28	684
1874	9,140	13	9	13,844		13	5	77,246	2 12	636
1875	11,208	14	19	14,810		15	4	91,698	2 20	660
Total.	242,072	14	22	325,363		14	21	2,489,964	1 75	$525

DISTRICT SUMMARIES.

CARIBOU.

YEAR.	Total ounces of Gold extracted.			Stuff Crushed	Yield per Ton of 2000 lbs.			Total Days Labor.	Average yield per man per day in dwts at $0.90.	
									Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	$1 62
1870	613	11	2	755		16	6	6,500	1.88	1 69
1871	504	15	23	479	1	1	1	2,964	3.40	3 06
1872	209	15	0	368		11	9	2,184	1.92	1 72
1873	17	16	12	21		16	23	312	1.14	1 02
1874	368	10	23	333	1	2	3	4,651	1.58	1 42
1875	446	12	19	368	1	4	6	3,675	2.43	2 18

WAVERLEY.

YEAR.	Total Ounces of Gold Extracted.			Stuff Crushed.	Yield Per Ton of 2000 lbs.			Total days Labor	Average yield per man per day in dwts @ $0.90.	
	Oz.	Dwts.	Gr.	Tons.	Oz.	Dwts.	Gr.		Dwt.	$
1862	1,507	0	0	3,741		8	1	46,800	66	59
1863	2,380	6	3	6,755		7	1	58,344	81	72
1864	6,410	4	22	9,238		13	23	88,244	1 44	1 29
1865	14,404	4	9	12,518	1	3	0	87,308	3 29	2 96
1866	8,612	17	11	16,750		10	6	98,800	1 74	1 56
1867	3,942	5	2	10,510		7	12	46,436	1 69	1 52
1868	2.387	8	22	6,372		7	11	36,972	1 26	1 13
1869	1,591	14	10	3,915		8	3	16,796	1 89	1 70
1870	811	3	21	2,619		6	4	13,546	1 19	1 07
1871	1,427	18	12	2,772		10	6	17,472	1 62	1 45
1872	1,047	17	0	1,761		11	21	12,766	1 64	1 47
1873	1,009	0	0	2,013		10	0	13,520	1 49	1 34
1874	1,553	12	15	1,682		18	11	12,541	2 47	2 22
1875	1,740	1	0	1,313	1	6	12	18,807	1 85	1 66

TANGIER.

YEAR.	Total Ounces of Gold Extracted.			Stuff Crushed.	Yield per ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts @ $0.90.	
1862	865	0	0	707	1	4	11	39,000	44	39
1863	494	8	21	655		15	2	37,410	26	23
1864	607	7	8	698		18	10	16,380	74	66
1865	644	7	13	639	1	0	4	13,156	97	87
1866	296	5	21	791		7	11	9,074	65	58
1867	691	14	7	724		19	2	6,864	2 01	1 80
1868	921	8	9	725	1	4	7	11,700	1 57	1 35
1869	1,192	3	10	1,332		17	21	15,938	1 49	1 34
1870	1,814	2	10	2,732		13	6	29,328	1 23	1 11
1871	2,093	0	7	2,924		14	7	27,326	1 53	1 38
1872	829	8	15	1,622		10	5	10,426	1 59	1 43
1873	726	11	15	1,070		13	4	8,892	1 63	1 46
1874	419	7	5	706		11	21	5,092	1 64	1 47
1875	448	2	15	1,106		8	1	6,667	1 34	1 21

UNIACKE.

Year.	Total ounces of Gold extracted.			Stuff Stamped	Yield per Ton of 2000 lbs.			Total Days Labor.	Average yield per man per day in dwts. at $0.90.	
	oz.	dwt.	gr.	Tons.	oz.	dwt.	gr.		Dwt.	
1866	72	16	9	28	2	12	0	1,326	1.09	$0 98
1867	1,622	13	20	1,968		16	12	14,274	2.27	2 04
1868	3,247	3	17	3,874		16	16	27,898	2.32	2 08
1869	1,867	3	12	3,172		11	18	22,022	1.69	1 52
1870	566	14	5	1,794		6	7	6,214	1.82	1 63
1871	360	17	3	900		8	0	4,342	1.66	1 49
1872	241	10	0	364		13	7	1,950	2.47	2 22
1873	129	8	18	198		13	1	1,222	2.52	2 26
1874	14	1	0	19		14	19	60	4.68	3 81
1875	139	3	3	319		8	17	2,613	1.05	0 94

WINE HARBOUR.

1862	1,688	0	0	835	2	0	10	12,792	2.63	$2 36
1863	3,718	2	19	3,644	1	0	10	36,688	2.02	1 81
1864	4,033	3	7	4,136		19	12	22,984	3.50	3 15
1865	2,200	5	14	3,833		11	11	16,588	2.65	2 38
1866	1,012	8	4	1,881		10	18	8,814	2.29	2 06
1867	845	18	14	1,670		10	3	13,390	1.26	1 13
1868	1,248	6	3	2,938		8	12	23,166	1.00	90
1869	719	8	19	2,726		5	6	20,462	.70	63
1870	914	15	14	2,356		7	17	8,034	2.27	2 04
1871	1,538	6	16	2,927		10	4	11,232	2.74	2 46
1872	2,572	10	18	2,305	1	2	7	8,840	5.82	5 23
1873	2,000	0	3	2,267		17	15	12,688	3.15	2 83
1874	623	11	6	1,193		10	14	5,605	2.26	2 03
1875	492	11	22	1,140		8	15	3,942	2.49	2 24

OTHER DISTRICTS.

1862	436	0	6	75	5	19	10	6,864	1.26	$1 13
1863	141	3	2	225		12	13	6,552	.43	38
1864	66	12	0	38	1	15	0	4,992	.27	24
1865	47	3	8	102		9	6	2,470	.38	34
1866	248	10	19	250		19	23	4,550	1.09	98
1867	39	6	17	16	2	9	3	4,992	.15	13
1868	316	6	22	518		12	5	12,636	.50	45
1869	424	12	15	761		11	3	15,444	.54	48
1870	378	5	15	812		9	7	7,956	.95	85
1871	112	2	16	281		8	0	2,808	.79	71
1872	402	0	13	2,552		3	3	5,668	1.41	1 26
1873	407	9	13	3,175		2	13	4,550	1.79	1 61
1874	622	16	18	3,212		3	21	7,327	1.70	1 53
1875	354	0	1	676		10	11	3,441	2.05	1 82

MONTAGU.

Year.	Total Ounces of Gold Extracted.	Stuff Crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwts. @ $0.90.	
	Oz. Dwt. Gr.	Tons.	Oz. Dwt. Gr.		Dwt.	$
1863	366 14 16	140	2 16 2	38,688	18	16
1864	1,052 19 14	545	1 18 15	11,492	1 83	1 64
1865	902 12 23	615	1 9 8	12,376	1 45	1 30
1866	496 15 10	382	1 6 0	6,032	1 64	1 47
1867	436 15 16	244	1 15 11	7,826	1 11	99
1868	584 14 22	350	1 13 10	7,384	1 58	1 42
1369	805 13 14	572	1 8 3	8,944	1 80	1 62
1870	3,831 9 5	916	4 3 14	15,106	5 06	4 55
1871	3,152 8 15	848	3 14 8	15,938	3 95	3 55
1872	1,793 10 6	683	2 12 17	13,832	2 59	2 33
1873	1,440 3 9	679	2 2 9	10,972	3 62	2 35
1874	655 0 22	496	1 6 10	5,452	2 40	2 16
1875	287 18 17	72	3 19 23	2,526	2 27	2 05

OLDHAM.

1862	51 0 0	84	12 3	4,368	23	24
1863	1,223 3 21	1,026	1 4 6	25,896	94	84
1864	1,750 5 12	2,238	15 11	37,934	94	84
1865	1,126 11 20	2,236	10 1	18,278	1 23	1 10
1866	956 12 20	966	19 19	11,362	1 68	1 51
1867	1,100 3 14	870	1 5 7	15,418	1 42	1 27
1868	719 0 4	1,012	14 4	8,008	1 79	1 61
1869	1,394 16 0	1,735	16 1	17,576	1 58	1 42
1870	2,051 15 3	2,644	15 12	20,254	2 02	1 81
1771	1,718 12 12	1,374	1 4 4	13,494	2 54	2 28
1872	1,014 11 10	793	1 5 14	8,580	2 36	2 12
1873	998 2 17	662	1 10 3	6,994	2 85	2 46
1874	665 8 11	527	1 5 6	3,420	3 86	3 27
1875	915 8 3	550	1 13 6	6,100	3 00	2 70

RENFREW.

1862	308 8 0	171	1 15 10	10,920	56	50
1863	785 7 7	575	1 7 7	21,216	74	66
1864	1,172 6 5	1,229	19 1	12,220	1 91	1 71
1865	1,008 10 18	927	1 1 18	14,430	1 39	1 25
1866	6,423 15 11	6,003	1 1 9	38,142	3 36	3 02
1867	7,904 19 2	7,222	1 2 4	61,308	2 57	2 31
1868	3,373 14 9	5,994	11 6	39,598	1 70	1 53
1869	3,097 15 7	7,258	8 12	34,606	1 79	1 61
1870	1,171 18 11	3,243	7 2	11,310	2 07	1 86
1871	1,179 17 16	2,463	9 4	10,972	2 15	1 93
1872	323 3 8	855	7 13	5,668	1 14	1 02
1873	59 16 18	255	4 16	2,028	59	53
1874	3 3 7	10	6 7	190	33	29
1875	47 16 6	113	8 11	690	1 38	1 24

SHERBROOKE.

YEAR.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per ton of 2000 lbs.			Total Days Labour.	Average yield per man per day in dwts. @ $0.90.	
	oz.	dwt.	gr.	Tons.	oz.	dwt.	gr.		dwt.	
1862	2023	0	0	663	3	1	0	22464	1 80	$1 62
1863	3304	14	12	3454		19	8	31200	2 11	1 89
1864	3419	14	20	2673	1	6	8	32630	2 09	1 88
1865	3424	1	21	2511	1	7	6	23010	2 97	2 67
1866	5829	13	8	2853	2	0	20	22490	5 18	4 66
1867	9463	18	0	7378	1	5	15	35958	5 31	4 78
1868	7070	0	5	9880		14	7	59540	2 37	2 13
1869	5546	11	16	11500		9	15	41964	2 64	2 37
1870	7134	4	0	11428		12	11	48880	2 91	2 61
1871	6579	19	7	13882		9	9	50856	2 58	2 32
1872	4188	9	21	5243		15	17	38246	2 21	1 98
1873	5026	0	4	7187		15	9	31460	3 19	2 87
1874	4037	1	2	5430		14	20	31199	2 58	2 32
1875	5818	15	10	6443		18	1	38683	3 00	2 70

STORMONT.

1862	397	0	0	197	2	0	7	12792	62	55
1863	1587	13	12	526	3	0	7	15600	2 03	1 82
1864	1510	4	21	636	2	7	11	25844	1 16	1 04
1865	1696	6	2	1040	1	12	14	25350	1 29	1 1[illegible]
1866	1254	17	9	2253		11	2	11208	2 23	2 00
1867	1266	16	15	782	1	11	3	12428	2 03	1 82
1868	673	2	17	596	1	2	14	14560	92	82
1869	227	0	13	590		7	16	6110	74	66
1870	578	5	15	1525		7	13	6552	1 76	1 58
1871	559	7	21	1937		5	18	5590	2 00	1 80
1872	472	0	11	543		17	9	4316	2 18	1 96
1873	37	18	5	181		4	4	832	91	81
1874	167	19	20	236		14	5	1799	1 86	1 67
1875	267	6	18	620		8	14	2543	2 10	1 89

GOLD.

General Statement for the year 1875.

Shewing the number of Mines at work, days labour performed, quantities of Quartz, &c crushed, yield of Gold, &c., &c. for the twelve months ended December, 31st.

Districts.	Number of Mines.	Days Labour.	Mills Employed.	Steam Power.	Water Power.	Total No. of Stamps working one day.	Quartz, &c. Crushed.	Yield per ton. oz.	Yield per ton. dwt.	Yield per ton. gr.	Maximum yield per ton. oz.	Maximum yield per ton. dwt.	Maximum yield per ton. gr.	Total yield of Gold. oz.	Total yield of Gold. dwt.	Total yield of Gold. grs.	Average yield per man per day, for twelve months at $18.00 per oz.
Caribou	2	3675	1	1	.....	....	368	1	4	6	1	16	11	446	12	19	$2 18
Gays River	1	1981	1	1	.....	....	2090	.....	2	9	.....	5	15	250	18	1	2 27
Montagu	3	2526	2	2	.....	....	72	3	19	23	18	9	6	287	18	17	2 05
Oldham	9	6100	2	.....	2	....	550	1	13	6	8	6	3	915	8	3	2 70
Renfrew	3	690	1	.....	1	....	113	.....	8	11	1	5	17	47	16	6	1 24
Sherbrooke.	9	38683	3	2	1	6460	6443	.....	18	1	11	.....	.....	5818	15	10	2 70
Stormont	2	2543	1	.....	1	....	620	.....	8	14	29	.....	.....	267	6	18	1 89
Tangier	3	6667	2	1	1	....	1106	.....	8	1	.....	19	13	448	2	15	1 21
Uniacke	2	2643	1	1	.....	....	319	.....	8	17	3	17	12	139	3	3	0 94
Waverley	3	18807	2	1	1	....	1313	1	6	14	2	14	10	1740	1	.....	1 66
Wine Harbor	3	3942	1	1	.....	....	1140	.....	8	15	2	3	.....	492	11	22	2 24
Unproclaimed, &c.	2	3441	3	2	1	....	676	.....	10	11	.....	19	22	354	.....	1	1 82
	42	91698	20	12	8	....	14810	.....	15	4	29	.....	.....	11208	14	19	2 20

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	CARIBOU.							GAY'S RIVER.							MONTAGU.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.
January	2	632	24	112	115	13	16	1	259	10	280	19	17	.....	2	258	10	10	11	9	.....
February	1	140	5	43	78	8	.....	1	260	10	250	17	11	11	2	265	10	.....	.....	.....	.....
March	1	475	18	.....	.....	.....	.....	1	297	11	240	30	7	18	3	326	12	16	90	17	21
April	2	642	25	72	88	12	1	1	154	6	240	25	17	.....	2	187	7	2	24	4	.....
May	1	630	21	.....	.....	.....	.....	1	150	6	240	19	3	.....	2	158	6	4	34	3	2
June	1	616	24	78	80	5	.....	1	156	6	230	20	14	.....	2	155	6	6	30	1	.....
July	2	455	16	54	77	14	2	1	201	8	230	26	17	.....	3	183	7	2	4	17	.....
August	2	85	3	9	6	.....	.....	1	136	5	200	26	9	.....	4	187	7	4	20	8	.....
September	.....	.....	.....	.....	.....	.....	.....	1	90	4	180	50	17	.....	3	200	8	6	21	3	.....
October	.....	.....	.....	.....	.....	.....	.....	1	71	3	.....	4	4	5	2	157	6	.....	.....	.....	.....
November	.....	.....	.....	.....	.....	.....	.....	1	207	8	.....	9	0	15	2	206	8	6	22	19	18
December	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	244	9	16	27	16	.....
	2	3675	.....	368	446	12	19	1	1981	.....	2090	250	18	1	3	2526	.....	72	287	18	17

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(*Continued.*)

Month.	Oldham. No. Mines.	Oldham. Days Labor.	Oldham. Men.	Oldham. Tons.	Oldham. Oz.	Oldham. Dwts.	Oldham. Grs.	Renfrew. No. Mines.	Renfrew. Days Labor.	Renfrew. Men.	Renfrew. Tons.	Renfrew. Oz.	Renfrew. Dwts.	Renfrew. Gr.	Sherbrooke. No. Mines.	Sherbrooke. Days Labor.	Sherbrooke. Men.	Sherbrooke. Tons.	Sherbrooke. Oz.	Sherbrooke. Dwt.	Sherbrooke. Gr.
January	4	300	11	11	38	12	5	...	...	...	...	...	...	...	9	3130	120	399	373	6	...
February	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	3074	118	693	653	19	...
March	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	3429	132	522	488	10	12
April	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	3484	134	459	431	12	...
May	12	500	19	39	79	10	19	4	30	1	...	...	...	...	8	3458	133	1009	731	11	...
June	12	600	23	80	125	7	21	5	75	3	19	14	14	...	9	3510	135	628	510	14	...
July	10	700	27	82	123	13	19	4	30	1	6	3	...	...	12	3588	138	522	510	6	...
August	10	700	23	46	*108	3	4	4	75	3	25	7	...	...	12	3640	140	708	606	6	...
September	12	700	27	45	79	10	15	3	120	5	40	6	3	12	6	2080	80	96	155	15	...
October	12	900	33	62	142	14	16	3	120	5	3	1	15	18	10	3146	121	520	656	4	...
November	12	900	33	107	124	12	2	3	120	5	...	...	...	...	9	3120	120	482	399	16	...
December	18	800	31	78	93	2	22	3	120	5	20	15	3	...	10	3024	116	405	295	15	22
	11	6100	...	550	915	8	3	3	690	...	113	47	16	6	9	38683	...	6443	5818	15	10

* 7 oz. from 20 tons tailings.

† 56 oz. from plates.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(*Continued.*)

Month.	Waverley. No. Mines.	Days labour.	Men.	Tons.	Oz.	Dwt.	Gr.	Wine Harbour. No. Mines.	Days labour.	Men.	Tons.	Oz.	Dwt.	Gr.	Unproclaimed, &c. No Mines.	Days labour.	Men.	Tons.	Oz.	Dwt.	Gr.
January	3	1317	51	88	108	10	...	2	235	9	152	39	18	......	3	422	16	......	......	...	...
February	3	1190	46	108	117	3	...	1	230	9	85	33	1	......	...	....	......	......	......	...	...
March	3	1340	52	110	140	...	...	1	192	7	112	29	11	17	4	452	17	15	9	8	...
April	3	1346	52	129	106	5	...	4	160	6	76	32	1	8	4	499	19	150	62	7	...
May	3	1237	48	81	96	12	...	2	110	4	52	43	18	14	4	418	16	112	92	10	13
June	3	1241	48	82	139	14	...	1	250	10	78	30	15	11	2	477	19	110	48	14	5
July	4	1356	52	80	*265	1	...	2	300	12	136	40	3	......	1	393	15	......	......	...	...
August	4	1982	76	91	*159	17	...	3	160	4	32	11	6	11	2	301	11	111	46	16	2
September	4	2014	77	163	86	11	...	3	283	11	60	28	6	12	1	343	13	178	94	4	5
October	4	1822	70	121	241	...	...	5	572	22	80	62	10	22	1	12	1	......	......	...	...
November	4	2080	80	105	141	6	...	4	696	27	164	68	16	20	1	70	2	......	......	...	...
December	4	1882	72	155	*138	2	...	3	754	29	183	71	19	......	1	54	2	......	......	...	...
	3	18807		1313	1740	1	...	3	3942		1140	492	11	22	2	3441		676	354	0	1

*71.11.0 from plates.
*15. 0.0 " "
* 5. 0.0 " "

MONTHLY STATEMENT FROM EACH GOLD DISTRICT. (*Continued.*)

MONTH.	STORMONT.						
	No. Mines.	Days Labour	Men.	Tons.	Ozs.	Dwts.	Grs.
January	1	150	6	....	...	...	..
February	1	300	11	....	...	...	...
March	1	260	10	....	...	...	..
April	2	256	10	....	...	...	...
May	2	250	10	253	201	16	...
June	2	180	7	....	...	...	...
July	3	196	8	50	2	19	18
August	3	180	7	152	26	12	5
September	2	192	7	....	...	...	...
October	3	198	8	....	...	...	...
November	3	230	9	165	32	18	19
December	3	151	6	....	...	...	...
	2	2543		620	267	6	18

MONTH.	TANGIER.						
	No. Mines.	Days Labour.	Men.	Tons.	Ozs.	Dwts.	Grs.
January	2	354	14	50	14	5	...
February	2	629	24	...	...	...	...
March	2	340	13	100	27	7	12
April	1	529	20	277	102	3	15
May	2	258	10	248	82	5	...
June	3	571	22	122	92	9	...
July	3	581	22	49	33	10	...
August	3	543	21	80	42	8	...
September	3	692	27	51	16	13	...
October	3	553	21	35	17	7	12
November	3	763	29	30	9	4	...
December	3	854	26	64	10	10	...
	3	6667		1106	448	2	15

MONTH.	UNIACKE.						
	No. Mines.	Days Labour.	Men.	Tons.	Ozs.	Dwts.	Grs.
January	1	100	4	...	...	...	...
February	1	100	4	...	...	...	...
March	3	285	11	22	17	13	20
April	1	174	7	1	3	3	...
May	1	320	12	7	10	12	...
June	1	162	6	...	...	...	...
July	1	20	1	15	26	17	21
August	2	300	11	...	...	...	...
September	2	380	15	43	29	12	12
October	2	175	7	92	23	10	22
November	2	327	13	64	13	16	...
December	2	300	12	75	13	17	...
	2	2643		319	139	3	3

FINANCIAL STATEMENT—GOLD.

Mines Department for 12 months, ended December 31st, 1875.

RECEIPTS.				EXPENDITURE.			
DISTRICTS.	Rents.	Royalty.	Totals.	Return of Rents.	Royalty Commission.	Salaries, Surveys.	Totals.
Caribou	$ 10.00	196.56	206.56	....	13.55	....	$ 13.55
Fifteen Mile Stream	16.00	78.67	94.67	....	3.84	....	3.84
Gay's River	40.00	104.21	144.21	....	4.78	....	4.78
Montagu	8.00	108.41	116.41	8.00	5.29	4.00	17.29
Oldham	108.00	396.54	504.54	14.00	19.96	226.50	260.46
Ovens	18.00	....	18.00	....	....	....	....
Renfrew	298.00	7.92	305.92	....	....	102.00	102.00
Sherbrooke	148.00	2196.37	2344.37	....	106.99	746.32	853.31
Stormont	48.00	100.06	148.06	....	7.18	310.13	317.31
Tangier	70.00	39.88	109.88	....	....	....	....
Uniacke	42.00	33.42	75.42	20.00	1.66	....	21.66
Unproclaimed	6.00	3.38	9.38	....	....	....	....
Waverley	14.00	637.76	651.76	....	38.21	....	38.21
Wine Harbour	30.00	134.74	164.74	....	6.12	475.50	481.62
Prospecting Licences	....	....	164.87	....	....	....	6.00
	$856.00	4037.92	$5058.79	$42.00	207.58	1864.45	$2120.03

OTHER THAN GOLD.

Mines Department for 12 Months ended December 31st, 1875.

COUNTIES.	RECEIPTS.				EXPENDITURE.			
	Licenses to search.	Licenses to work.	Royalty.	TOTALS.	Return licenses to search	Return licenses to work.	Surveys.	TOTALS.
Antigonish	$300 00	50 00	....	350 00	....	....	....	....
Annapolis	20 00	....	....	20 00	....	....	....	....
Cape Breton	760 00	800 00	22922 17	24482 17	77 87	247 93	....	325 80
Colchester	400 00	50 00	....	450 00	20 00	....	....	20 00
Cumberland	660 00	575 00	3407 68	4642 68	20 00	....	200 00	220 00
Guysborough	140 00	....	....	140 00	20 00	....	....	20 00
Hants	20 00	50 00	....	70 00	....	....	....	....
Inverness	340 00	150 00	....	490 00	20 00	....	....	20 00
Lunenburg	20 00	....	....	20 00	....	....	....	....
Pictou	420 00	300 00	24510 07	25230 07	40 00	....	....	40 00
Richmond	260 00	....	....	260 00	20 00	....	....	20 00
Victoria	140 00	50 00	540 00	730 00	....	....	....	....
	$3480 00	$2025 00	$51379 92	$56884 92	$217 87	$247 93	$200 00	$665 80

ABSTRACT ACCOUNT.

RECEIPTS and EXPENDITURE for the Twelve Months, ended 31st December, 1875.

RECEIPTS			EXPENDITURE.		
Licenses to Search Coal	$3480 00		Return Licenses to Search Coal	$ 217 87	
" " Work "	2025 00		" " Work "	247 93	
Royalty "	51;379 92		Surveys "	200 00	
		56,884 92			665 80
Rents Gold	856 00		Return Rents, Gold	42 00	
Royalty "	4.037 92		" Prospecting Licenses "	6 00	
Prospecting Licenses "	164 87		Royalty Commission "	207 58	
		5058 79	Salaries and Surveys "	1864 45	
					2120 03
			General Expenses	5502 46	
			Postage	66 04	
			Stationery and Printing	1028 77	6597 27
		$61,943 71			$9383 10

REPORT

OF THE

DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1876.

HALIFAX, N. S.:

PRINTED BY THE NOVA SCOTIA PRINTING COMPANY,

1877.

CONTENTS.

DEPARTMENT OF MINES.

REPORT

FOR THE YEAR 1876.

To His Honor the Honorable ADAMS GEORGE ARCHIBALD, *C. M. G., Lieut. Governor of Nova Scotia, &c., &c., &c.*

MAY IT PLEASE YOUR HONOR:—

The undersigned herewith begs to present to Your Honor the annual report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1876.

ROBERT ROBERTSON,
Commissioner of Public Works and Mines.

Halifax, February 6th, 1876.

REPORT

ON THE

INSPECTION OF MINES IN NOVA SCOTIA,

For the Year ended 31st December, 1876.

By HENRY S. POOLE, F.G.S., Associate of the Royal School of Mines, &c.

Halifax, February 1877.

Sir,—I have the honor to submit the following annual report on the mining operations in this Province during the past year.

The present condition of the several industries mentioned as compared with those of former years is shown in the following

GENERAL SUMMARY:

Minerals.	Quantities.			
	1873	1874	1875	1876
Coal................tons.	1,051,467	872,720	781,165	709,646
Gold*..............ounces.	11,852	9,141	11,208	12,039
Iron Ore.............tons.	3,485	2,469	4,467	15,274
Manganese........... "	131	....	7	16
Copper.............. "	....	....	....	45
Lead .... "	....	....	....	6
Gypsum.............. "	120,693	104,140	95,159	80,920
Freestone, &c......... "	2,820	8,829	5,778	5,905
Limestone............ "	....	448	4,860	1,094
Moulding Sand........ "	130	300	100	227
Barytes.............. "	....	208	175	....

* Unsmelted Gold valued for Royalty at $18 per ounce. The average real value of smelted Nova Scotia gold is high, $19.22 per ounce.

Under their respective headings the several minerals wrought are separately referred to, and some matters more especially relating to them are at the same time briefly considered.

COAL.—It will be seen that there has been no renewal of activity, but on the contrary, a further decline in the chief industry, the coal trade; a falling off to the amount of 71,519 tons having occurred within the year. The total produce 709,646 tons, being only 67 per cent. of that of 1873. With respect to the anticipated export trade of the current year, it is much to be regretted that the present indications do not point to much, if any, increase. The details of the trade and the destinations of the exports will be found as usual in the appended tables. References to pit-workings and to colliery practice and to matters of more special interest to miners are touched on in other parts of this report.

GOLD.—The comparative steadiness of the yield from the Gold mines of late years holds out hopes that future annual statements will show no further decline and possibly a slow increase.

IRON.—The completion of the Blast Furnaces at Londonderry and the erection of a rolling mill by the Steel Company of Canada in addition to their other works promise to enrole Nova Scotia Iron among the competing brands for the trade of the Dominion, and to raise iron-mining to its proper position, second on the list of mining industries. Late discoveries of iron-ore, and further reference to the works at Londonderry will be subsequently mentioned in due course.

COPPER.—Touching here only on the salient points connected with the development of each industry, it will suffice to remark respecting copper that further explorations in Antigonish county confirm more and more the anticipations suggested long ago by surface indications that copper ore exists in workable quantities in the district of country about Lochaber. Hopes may now be reasonably entertained that copper mining and copper smelting will before long rank among the permanent industries of this Province; especially if the much needed facilities for transit are supplied by an advantageous proximity of the Eastern Extension Railway.

LEAD.—The hopes which the discovery of a vein of galena at Caledonia suggested last year have not as yet been confirmed by the explorations. The work of prospecting has, however, not been abandoned and a workable vein may yet be found in the district. Of the ore taken out 5 tons were shipped to England for sale.

MANGANESE.—The Ores of Manganese found at several points along the shore of the Basin of Minas are of well-known purity and the high price which such ores now command should induce further explorations for extensions of the deposits. Since the discovery of Manganese at Teny Cape some 5000 tons have been mined.

NON-METALLIC MINERALS.—The quantities of Gypsum, Freestone, etc., given in the general summary as shipped from Nova Scotia are compiled from statements most courteously supplied direct by the Collectors of Customs at the several shipping ports. The figures given do not include quantities quarried for local consumption, and some of the shipments to ports in Canada. To ports on the St. Lawrence perhaps as much as 5,000 tons of Gypsum were shipped—chiefly from the Great Bras d'Or, C. B. To Prince Edward Island, Cape

Breton doubtless sent as usual over 4,000 tons of Limestone, but no accurate account could be obtained as the closing of the St. Peter's Canal for repairs turned the trade from the Bras d'Or to Lennox Passage and other outside places where Limestone is quarried.

MATTERS OF GENERAL INTEREST similar in purport to such as are added to this report were inserted in previous ones and accepted as not entirely foreign to the object of these annual reports. The chief object of which is, it may be said, to record and to disseminate information concerning past mining operations in the Province. But as they fall into the hands of many who have few if any other means of knowing what is done elsewhere than in the Province these brief references to extraneous matters are inserted for their information. Moreover there is reason to believe that the references already given to outside practice, and to the introduction of modifications have not been without influence in inducing further trials and improvements at other establishments.

ROYALTIES.—A general impression has become prevalent in the Province that the royalties paid into the Provincial Treasury bear hardly on the mining industry. By frequent repetition this has become a fixed idea, and many think that the industry is by the imposition of royalties exceptionally taxed and disproportionately so to other industries of the country.

In accordance with your request I have collected, in the following article, data, which appear to show that, however much we may desire that every facility should be given to aid the development of mining in Nova Scotia, it is evident that the imposition of royalty, or its equivalent, is all but universal and by no means exceptional here ; and further, that our miners enjoy unusual facilities for searching for and working minerals. So that it would seem while for the purposes of revenue money is collected by means of royalties no irritation can be justly caused by regarding the royalties demanded as special taxes. Supposing for a moment it were agreed that the royalty, say on coal, should be remitted. The first question that would be asked would be to whom shall the mineral rights be given ? Whether to the owner of the soil or to the individuals who have been lucky enough to obtain mineral leases from the public. Now the owner of the soil does not ask the public to give him the right to the subjacent minerals which were specially reserved in his grant of the surface, and why the public, which reserved the minerals to acquire a revenue by means of a royalty imposed on the proceeds of workings in lieu of a fixed sum per acre, should resign their rights to the mineral speculator is not very apparent.

Touching first on the claim of the landowner, the great legal authority, Sir Edward Coke, states " that the word *land* includes not only the face of the earth, but everything under it or over it. The owner of the soil would therefore be according to the above maxim entitled to the minerals beneath the soil, had not the Crown on taking possession of this country reserved these rights. But, writes Arundel Rodgers in " The Law of Mines, Minerals and Quarries" the title of the freeholder, or the lord of the manor in the cases of copyhold, commons and waste lands is capable of being rebutted or qualified by evidence showing distinct ownerships or rights in different persons ; and in England it

not only frequently happens that the ownership in minerals is vested in one person, and the soil in another, but several distinct ownerships. and rights to different minerals under the same surface, and even of qualified interests to minerals, both when distinct and blended with the ownership of the soil, do exist. For instance, the Sovereign is entitled to all gold and silver, whether found in the demesnes of the Crown, in the highways, or in the lands of private persons, situate in England or Ireland. The Crown is also proprietor of the soil and of all the minerals beneath the soil in the Forest of Dean, subject to the right of the "free-miners" of that district to a grant from the Crown to work the minerals upon payment of a royalty; and in the parts of Derbyshire where the mining customs prevail Her Majesty in right of her Duchy of Lancaster, is the owner of the lead mines, whilst any of Her Majesty's "liege subjects" are entitled freely to enter upon and to work those mines without even the permission of the owner of the soil or of Her Majesty.

In Scotland the Crown has no right, not even to the precious metals, but only to a royalty payable out of the produce. The eldest son of the Sovereign has an indisputable title to all minerals under certain lands in Cornwall belonging to private persons. In the north of England one person is not unfrequently entitled to the coal, whilst another is entitled to the ironstone; one may be the owner of the seams of coal, whilst another may possess the seams of sandstone or other like substrata; and two or more seams of coal under the same lands may be sometimes vested in different proprietors.

These instances of distinct ownerships and rights are analogous to the civil law. Under the Roman Empire, all mines, minerals and quarries, and indeed the soil itself, belonged to the state by right of conquest. In some of the provinces on the allotment of land to private individuals the conquerors reserved the rights to the minerals for the benefit of the State. But there was no universal law, and variations were made in the laws of different provinces by successive emperors, as well for state purposes as for the advantage of private persons.

Gratian gave a general permission to take minerals from the lands of private persons on paying one-tenth to the state and another tenth to the owner. His degree was adopted by Valentinian and Theodosius Maximus.

The Emperor Valentinian published a rescript which allowed the state mines to be worked by private persons on payment of a royalty. The state retaining the right of preemption when the gold found exceeded a certain quantity. The royalty was called *canon metallicus* and was fixed at eight scruples in gold dust for each worker in the mine."

Merivale, in his History of the Roman Empire, writes, 'Over the treasures concealed beneath the soil, the state claimed the same paramount dominion as over the produce of its surface. The mines and quarries throughout Italy and the provinces were held in part by the Roman people, and farmed, like the land tax, to private speculators; in part conceded to private proprietors, with the reserve of a fixed rent for the privilege of working them.'

In Gamboa's Mining Ordinances in Spain it is stated that, 'By the civil law, all veins and mineral deposits of gold, silver and other

precious stones, belonging if in public ground, to the sovereign, if in private ground to the owner of the soil, subject to this condition in the latter case, that, if worked by the owner, he was bound to render a tenth part of the produce to the prince, as a right attached to his crown; and if worked by any other person, by consent of the owner, the former was liable to the payment of two-tenths, one-tenth to the prince and one-tenth to the owner.'

Germany is the country where it is supposed the Soverigns first succeeded in establishing their pretensions to a royalty on mines.

The law for the Prussian States formerly imposed a duty of a tenth on the raw material and whether the mines were worked or not there was a small duty of one thaler per annum paid on the concession. Subsequently the duties were reduced; and a new decree in reference to all mines dated January, 1865, reduces the royalty to one per cent. There were also formerly innumerable taxes and commissions paid by the mines, to cover the costs of scientific and financial administration, all of which are now abolished, and instead thereof a regular tax of supervision, amounting to one per cent. of the value of the product, is levied on mines in actual operation only.

The ancient royal rights of the State of Austria extended to every kind of mineral, and the new law of May 22, 1854, confirms those rights. The sovereign is now entitled to a double duty, the one fixed depending upon the area of the mine, the other variable, being one-tenth of the raw product payable in money.

Spain—by a decree of Amadeo I., dated 24th July, 1871, concessions for working mineral substances were given in perpetuity, subject to an annual quit rent per hectare, fixed as follows:—For precious stones and metalliferous substances, iron excepted, ten piacetas ($2) per hectare. Iron, combustible substances, &c., four piacetas (80c.). These latter, by a decree of the government in 1868, were subject to an annual quit rent of $3 per hectare.

France.—By the Code Napoleon, each mine paid a certain fixed sum per annum, according to the size of its field, and also a tax of 5 per cent. on its net profits. To this amount one-tenth was added to cover incidentals. The net profit was ascertained by subtracting the current expenses only, not the cost of permanent improvements, from the total production. These taxes amounted in the aggregate to about 2 per cent. of the gross product; and since the 1st of January, 1865, they have been replaced by a single tax of that amount. It is, of course, much easier to collect a tax on gross receipts than on net profits, and the result is the same to the mines. *(Raymond Statistics 1869).*

Mexico.—Since 1822 there have been some modifications of the fiscal laws. The total amounts of the present duties are four and a half per cent. on silver, and three per cent. on gold.

Italy.—By the mining laws of 1859, Arts. 59-61, every concessionaire shall pay to the state a fixed tax and a proportional tax. The fixed tax shall be 50 centimes for every hectare (2½ acres) of land included in the concession, and must in no case be less than 20 lire ($4). The proportional tax shall be five per cent. on the net produce of the minerals, and will be settled yearly by the governor of the province, on the report of the mining engineer. Art. 63, The govern-

ment may remit in whole, or in part, the proportional tax payable by the concessionaire, in case of heavy expenditure, extraordinary works, or on account of damage suffered from accident not imputable to negligence. Such remission must be by royal decree.

These references to the sovereign's right to minerals in Europe have been taken, and chiefly almost verbatim, from Rodgers book on the "Law of Mines, Minerals, and Quarries." But, in Nova Scotia, the Crown having taken possession of the country, claimed both the land and the minerals and having distinguished between them by reserving the latter in the grants of land to settlers, the rights of the Crown to the minerals here stand in a different relationship to what those of the sovereigns of Europe do to the miners of that Continent.

In many of the cases quoted, the royalty claimed became a special tax on the mining industry to the Crown, but the dues called royalty in Nova Scotia are more comparable to the dues also called royalty paid to the freeholder in England, and to those similarly named and paid to the land-owner in the United States.

Turning to the Statutes of the United States, it will be seen that by a resolution of the Senate and House of Representatives of the United States of America in Congress assembled, dated 30th January, 1865, it was provided that no Act passed in the first session of the 38th Congress, granting lands to States or corporations, should be so construed as to embrace mineral lands, which in all cases were declared to be reserved specially to the United States, unless otherwise specially provided.

A subsequent Act passed in the following year declares that mineral lands of the public domain, both surveyed and unsurveyed, are to be free and open to exploration and occupation by all citizens of the United States and those declaring their intention to become citizens, subject to such regulations as may be prescribed by law. A claimant to a mine on a vein may obtain a patent from the General Land Office, after complying with certain regulations, on payment of five dollars for each acre.

Coal lands are by the same ordinance regulated to be sold at twenty dollars per acre, when they are within fifteen miles of a completed railroad, and when they are beyond, at ten dollars per acre. An individual may enter any area not exceeding 160 acres. An association may enter any area not exceeding 320 acres. An association of more than four persons duly qualified, who shall have expended not less than $5,000 in working and improving any coal mine, may enter on an area not exceeding six hundred and forty acres. The *opening* and *improving* of a coal mine in order to confer a preference right of the purchase, must not be considered as a mere matter of form; the labor expended and the improvements made must be such as to clearly indicate the good faith of the claimant. (See—The Revised Statutes of the United States relating to Mineral Lands and Mining Resources, by W. A. Skidmore.)

As to the actual sums paid as "royalty" to the owner of both land and minerals, Mr. P. W. Sheafer, the well-known mining engineer of Pottsville, kindly informs me that in the Southern Anthracite field a royalty varying from 25c. to 50c. per gross ton mined and shipped to market is paid. The average being about 35c. From the best

collieries 50,000 tons is about the minimum quantity required to be annually mined. In cases where the coal lands are sold and no rights to royalties are reserved, the price varies from $100 to $1,000 per acre. On an average the price is $500 per acre.

Mr. J. M. Williams, Inspector of Coal Mines in the Wyoming Region, has had the kindness to give me the result of his experience, and to state that the prices, rents and royalties depend so much on the thickness of the seams, the number of the seams, the thickness of the overlying strata, the conveniences for extraction and transportation, &c., &c., that they vary considerably; and that the selling price ranges from $300 to $1,200 per acre; the royalty varies from 12½c. to 30c. per ton, and on an average is 25c. per ton on all coals that have passed over screens of ⅝ths to ⅞ths inch mesh. And that when the minimum output is not reached, an equivalent rent of from 40c. to $1 per acre is exacted.

Mr. Andrew Roy, Inspector of Coal Mines for Ohio, has placed me under obligations to him for information respecting the bituminous coal fields of the West. He informs me that the price of coal land ranges from $60 to $500 per acre, and that the average selling price in Ohio is about $150 per acre, in Indianna $100 per acre, and in Illinois $75 per acre. Little renting of coal lands is done west of Ohio, and when sold they are dearer in Illinois than in Iowa or Kentucky. In north-eastern Ohio, the royalty charged ranges from 25c. to 75c. per ton, and the coal lands sell from $150 to $500 per acre. In south-eastern Ohio the lands sell from $50 to $150 per acre, and the royalty ranges upwards from 6¼c. per ton. The average in the State may be set down at 25c. per ton.

In the north of England, Bainbridge writes, rents and royalties vary from 5 to 14 per cent. of the value of the coal.

The toll tin rendered by the free-tinners of Cornwall to the lord of the soil was, until lately, one-fifteenth of the produce.

In the High Peak of Derbyshire, the duty paid to the Crown in right of the Duchy of Lancaster, is usually one-nineteenth part of the lead ore raised; though a full tenth is said to be due. The lord is also entitled to "cope" sixpence for every load of ore carried off the ground.

Mr. Warington W. Smyth, H. M. Inspector of Crown Mines, and lecturer on mining at the Royal School of Mines, London, replying to an enquiry of mine on this subject, kindly wrote the following concise resumè:

"The royalties, as a rule, in Continental countries are very much lower than in the British Islands, being there almost universally connected with the idea of the minerals being the property of the nation and worked under restrictions, carried out by national officers, whether Imperial, Royal, or Republican, who have charge of the districts, ordering certain works, restricting dividends, &c. Prussia, and Germany generally, used to suffer under a great multitude of imposts, which, I believe, are merged in a royalty of 2 per cent on the gross produce. In France and Italy the royalty is taken upon the profits instead of the gross. In Great Britain it is usual, except with iron ores, to take a fractional part of the whole as royalty or dues payable to the owner of the mineral. You know that here there is no pro-

perly so-called royalty, *i. e.*, sum paid to the government, except for mines which happen to be in Crown lands. In the north, the proportional dues have been from 1-5th (retained so high only in a few cases) to 1-7th, and to 1-10th the more frequent. In the south and west (Wales and Cornwall) 1-10th is the highest and is now unusual, because of depth, water, &c. It is more commonly from 1-10th to 1-18th; and in the case of old and deep mines 1-18th to 1-30th is not uncommon. 1-15th may be looked upon as the highest limit in the westernmost counties, and this refers to all the metallic minerals.

"Where a money rate is placed as the due on iron ores, it is from 4d. as in some poor stratified oolitic, &c., ores, to 6d. or 9d. on common ores, and to 2s. 6d. per ton on special and well-placed hæmatites. During the prosperity of two or three years ago, I heard of 3s. 6d. and even 4s. 6d. per ton being offered to private owners as royalty on hæmatite in the Furness district.

"With coal, from 1-8th to 1-20th of the selling price is sometimes required, but there are many other ways of taking the royalty, as you probably know,—all sorts of rates, from 3d. up to 2s. 6d. per ton, and ways of paying per acre, or per foot thick per acre. * * *

When leased mineral rents I have to deal with run from £5 in unknown speculative cases to £2000 a year when the mineral is pretty certain."

Dunn, in the "Winning and Working of Collieries," published 25 years ago, states that the royalties in the north of England then varied from 6d. to 12d. for round coal, and from 2d. to 4d. per ton of small coal. And in Scotland and elsewhere, from one-twelfth to one-fourth of the value sold. Throughout Lancashire and the neighboring counties the coal is let and sold by the Cheshire acre, which consists of 10,240 square yards; the statute acre being 4,840. The rent is levied at so much per foot thick per acre, the said footage ranging from £40 to £140 per acre. The measurements are made half-yearly. By this system it is clearly to the advantage of the lessee to produce the greatest possible yield per acre. The available produce of ordinary mining may be stated at three-fourths of the gross contents.

The above mentioned rate would be equivalent to a royalty on the gross contents of from 3d. to 10d. per ton. Mr. Ashworth, of Burslem, informs me that now the rents in Lancashire vary on an average from £70 to £100 per foot thick of coal, per Cheshire acre. While about Burslem the rents vary from £30 to £40 per statute acre. Where coal and slack are paid for by the ton sold, the price averages 10d. for round coal and 5d. for slack.

Hislop, in his *Colliery Management*, 1876, treating of mineral leases, after referring to *fixed rents on tonnage*, says a second mode of leasing coal is by *proportion*, or payment of fixed portion of the selling price. It is very equitable in principle, being lighter on the tenant in dull times, and only heavier when he is better able to bear it; but the trouble is to arrive at a fair value. A third mode is to *lease by the acre*, as already referred to in the extract from Dunn's Winning and Working of Collieries.

The tributers at the gold mines of Nova Scotia recognize the equity of payment of royalty to private individuals holding leases from the Crown, for they agree with such lessees to "take a lay" at

5 per cent., or 10 per cent., or even 25 per cent. of the value of the gold product from leads of proved value, in preference to paying to the Department of Mines $2 an area and only 2 per cent of the product for unproved lands. The sums so paid to private individuals are as rightly called "royalty" as those paid by the direct mineral lessee into the Provincial Treasury.

Mr. Richard Brown, whose carefully compiled book on the Coal Fields and Coal Trade of Cape Breton will always be a standard authority on the early history of the trade, gives in detail the several leases issued by the Imperial Government to work the mines of Nova Scotia. On referring to his book it will be seen that in 1792 a lessee agreed to pay a royalty of 3s. per ton. In 1802 William Campbell paid 4s. a ton, and subsequent lessees in 1813 and 1821 paid a royalty of 3s. 8d and 3s. 6d. per ton. In the following year Messrs. Bown took a lease at 4s. 3d. per ton. In 1825 the grant of all the unreserved mines and minerals to the Duke of York was given, and in it the royalty was fixed at 1s. sterling per ton. The General Mining Association who obtained the rights of the Duke of York also, three years later, leased from the Local Government the reserved mines, and it was agreed by all the parties concerned that the royalty should be 2s. currency per Newcastle chaldron,—equal to 10d. per ton. The dues to the Duke of York under the sublease to the General Mining Association were at the rate of 8d. per ton. Then by a subsequent agreement between the Crown, the Local Government, the creditors of the Duke of York, and the Association, which need not be touched upon further here, in 1858 the present arrangement was affected.

Mr. Brown also states that when the country was a French colony Governor Denys obtained a concession in 1654 from Louis XIV. of the whole island of Cape Breton, with full powers to search for and work mines of gold, silver, copper and other minerals, paying to the king one-tenth of the profit. And further that M. Duchesneau, the Intendant of France in 1677 recognized and established Denys's right to exact a duty of twenty sous per ton from all persons taking coal from Cape Breton.

The Local Government of British Columbia retaining the same rights and privileges as the Crown retained in Nova Scotia, have leased some coal mines at a royalty of 10 cents per ton; but they also require in addition an annual rent of $100 which of itself is a very nominal sum for a company working a lease to pay. It is however, sufficient to check monopolists from taking out leases of large areas and holding them at no expense (as is done here) against a possible rise in value of coal lands and a making an advantageous sale. It is to be regretted that a similar annual rent is not required from lessees in this province that bona-fide miners might be separated from monopolists. At present the only anxiety that the latter have concerns the royalty after 1886. For the uncertainty of the future rate as the time approaches militates more and more against their prospects of a sale.

Had the Crown granted its rights to the minerals in Nova Scotia to the owner of the soil, companies and individual speculators proposing to mine in this country would have had to purchase their privileges from the owners precisely as we have seen is the practice in

parts of the United States, and they would have to pay proportionate prices. The sums paid for coal lands in the United States have been stated, and also the royalties that are charged when properties are leased; and the interest in the one case and the rates in the other, represent a higher per centage on the value of the coal sold than does the royalty paid to the Local Government of Nova Scotia. Had the Crown established the same practice here as has been adopted in the United States, of selling coal lands at a fixed price per acre, then the areas now leased, 240 square miles, would have capitalized the sum of $3,072,000 the interest of which at 5 per cent. would yield a revenue twice as large as the royalty now paid ever produced.

When the present system was instituted in 1858, approval of the arrangement was general, and the impetus which it gave to exploration and development was regarded as highly satisfactory. Speculators then recognized the great value of the system which left the ownership in the hands of the Government and gave to them privileges and advantages which had they had to deal with divided interests they could never have acquired.

To what extent the country would be benefitted by a withdrawal of the royalty has yet to be shown by those who contend that it would by the consequent increased trade. It has never, unfortunately, been shown in what direction the trade would be developed by so small a reduction as 10 cents on the ton. Elsewhere it is stated how strong the outside competition is for all but the Home Consumption.

There is yet a point in this consideration that it might be well to remember, and that is that the interests of the Local Government respecting the general condition of the country are only comparable to those of a large corporation and not to those of a general government interested alike in all sources of trade and revenue.

Even were the several industries of the country, the agricultural, the fishing and ship-building, and the carrying trade to be benefitted by a reduction in the royalties, their increase would not repay the loss to the Local Government, for besides mining, no profit is derived from any increase except from that of the population per capita. The Local Government then have to be considered in the light of a corporation owning mining property and leasing it to others to work.

UNWORKED AREAS.—In the foregoing article on Royalty several references are made to the terms under which mining properties are leased in other parts of the world. And it will be noticed that besides requiring a royalty a stipulation is inserted in leases that a rental shall be paid in lieu of a minimum amount of royalty when no minerals are obtained. In Nova Scotia this condition of things was not anticipated and no lease contains such a stipulation. In the case of lessees who are actually working their areas its omission is immaterial, but it is different in the case of others who hold their areas from year to year and who besides having paid down no sum for their privileges hold them at no expense.

The property they have acquired is certainly subject to forfeiture after six months notice for non-fulfilment of agreement. It is not forfeited, however, on account of non-fulfiment, for the simple reason that there are now more mines opened than there is trade to supply, and the re-leasing of any unworked areas would not put more royalty

into the Provincial chest. Still it may be asked why should this property of the Province be allowed to remain in the hands of individuals who give no return for their privileges; and secondly were it private property would the practice be permitted? The answer to the first question is that it is a matter for the legislature. And to the second:—Undoubtedly were it private property the present practice would *not* be permitted. Yet I deem it not altogether hopeless to draw attention to the matter for it seems to be but right that if persons are willing to speculate with public property they should pay for this privilege as they would have to do were they dealing with private individuals.

British Columbia has regarded this matter in this light and does impose (I am informed) an annual rental of $100 per square mile. A private individual leasing such property would require a similar provision or else prefer that his property should remain entirely his own, untrammeled by an unprofitable lease which sometime or other might prevent him from granting another lease on more remunerative terms. It is not too late to adopt the system in Nova Scotia. Lessees of unworked areas could be given their required six months notice with the option of renewing their leases with the additional clause inserted. The holders of areas with mines in operation would not side with the holders of unworked areas in opposing any legislation to effect this object since they contend that in the present state of trade the royalty caps any little profit they may make, and that while their property depreciates annually the holders of unworked areas retain theirs free of expense.

Spontaneous Combustion of Coal.—The Royal Commission of enquiry on this subject, which was referred to last year, have brought their investigations to a close and have submitted their report with an appendix containing the evidence brought before them.

The advisability of furnishing any information adverse to the character of Nova Scotia coals has been questioned, and reference made to such information as was published in the Report of the Royal Commission. The object in sending the statements as published was that a position, as correct as our present knowledge warrants, might be given to Nova Scotia coals in comparison with the bituminous coals of England and the United States. In forwarding the conclusions derived from enquiries in the United States and the Upper Provinces, and of local authorities, care was taken to speak of the coals mentioned as a class and not as the product of particular mines lest wrong influences might be drawn and prejudicial comparisons made between those mentioned and those not mentioned. The evidence given cannot be regarded as complete, and as full information respecting the product of any one seam is wanting, an absence so far as is known of circumstances conducive to spontaneous combustion, can no more be accepted as a guarantee of quality than a record hitherto clean can be taken as a guarantee of future immunity from accidents in the case of a mine in which fire-damps exudes.

The statement that nearly all Cape Breton coals heat under certain conditions may be new to the general public but it is not so to large consumers, who are also not ignorant that nearly all bituminous coals are liable to spontaneously ignite, and that therefore the question

at issue is merely one of comparative freedom from a dangerous liability. In England it is openly stated that such and such coals are dangerous to ships and underwriters refuse to insure some of them. In the Report of the Commission, some of the coals more prone to ignition are mentioned. As for example Parson's Abbey Graigola Coal, No. 2 Rhondda and Fothergills, Aberdare, of South Wales, Crow Orchard of Lancashire, &c.

The Admiralty have tried the steam coal from Cumberland, Maryland, and although its excellence as a steam coal is acknowledged, its use has been discontinued on account of the danger attending it. On the contrary the Pictou coal was favorably reported on. The experience of the barque " Senator" shows that the semibituminous coals of Broadtop and Clearfield, either one or both, are not perfectly safe. While the actual loss of a vessel from the spontaneous combustion of Nova Scotia coal has yet to be recorded.

Persons acquainted with the coal trade are probably aware from which mine came the coals referred to in the cases instanced in the report of heating on shore, and they may also know that some coals bear a better name in the general market that those from other pits on the same seam.

Designing dealers have proclaimed the danger attending the use of the coals of others to raise, if possible, the character of their own; but as all such subterfuges are, sooner or later, exposed and often reflect back on a whole district, an honest policy in the long run pays the best. If there be any natural want in the quality of our coals, and crude methods of handling are practiced and perpetuated in spite of the experience of others, it is better to acknowledge them and meet or remedy them, if possible, than to continue to shut our eyes and deny their existence.

Every one will allow that coals vary in character, that some are better suited for gas, some for domestic, and some for steam purposes, than others; again, that some are excellent for specific purposes, if speedily used in the neighborhood of production, while others of inferior quality are better for the same purpose if both are subjected to much handling and long confinement on shipboard. Knowing, then, these things, what we want to get at is the proper position which the several coals should occupy in the open market. If our gas coals come into competition with other gas coals of a well recognized grade, the mere saying they are as good will not make them so. We know that Penn and Westmoreland coals bear a higher character and are preferred at some gas works, because they contain a less percentage of sulphur than the run of Provincial coal that goes to Boston and New York, but it is also known that they are none the less liable to spontaneously ignite, and that Cape Breton coal has one advantage over them, which is that it makes better coke.

As to the precentage of sulphur in our gas coals, an average of fourteen analyses gives 2.05 per cent., (vide, Table of Analyses, page 47, Report for 1875) an average certainly higher than that of the best American coals that find their way to the Eastern markets, but under that of the general run of Western coals. The table was published to refute the sweeping assertion of Professor Chandler, of New York, that Provincial gas coals contain from 3 to 5 per cent. of sulphur.

Simply because the run of our coals that are sent to New England and New York to compete with the best American yield a higher percentage of sulphur, they have been under-rated, and such general statements as that of professor Chandler accepted without investigation.

Still, a creditable position is not to be maintained by mere denial of short-comings and by ignoring imperfections. What care will do has been shown by the different characters born by coals from the same seam, but under different management; and every credit is due to the management that achieves such a distinction. Whether that complete preparation which the nature of the several coals will admit of has yet been affected, is a matter of doubt. There is, of course, a limit to the amount of care and handling that will pay, and a radically bad practice may be perpetuated on the plea of the great expense which a change would undoubtedly entail. Whether the character of our seams has been sufficiently well studied is also a matter for question. It is doubtful whether the various companies can tell the relative value and composition of the several plies of the seams they work, the percentage of sulphur and ash in the different plies of the gas coals, and whether the sulphur is collected in "brasses" or streaks, or finely disseminated through the tissue of the coal. If the latter, no amount of hand-picking can reduce the percentage of sulphur, while careful picking can extract the "brasses" and slaty portions.

The range in the analyses' per centages suggests what might possibly be attained by judicious selection, and if the present appliances are not equal to the duty required the seams that cannot be now cleaned do not spoil by being kept for future use.

The enquiry of the Royal Commission established some general facts of value to all interested in the coal trade. Although in a way they are not new, still being the result of cumulative evidence they may be considered authoritative, and, as such, worth noting here.

1. That certain descriptions of coal are intrinsically dangerous for shipment on long voyages.

The degree of danger is not proportionate to the precentage of sulphur contained in the form of iron pyrites. The evidence on this side of the Atlantic show that Cumberland coal, the purest from sulphur that is shipped, has been condemned by the Admiralty. Albertite, perfectly free from sulphur has yet taken fire. Then the liability to heat of flour dust, freshly burnt charcoal, lamp black and oiled cotton waste, all declare that spontaneous combustion may take place in carbonacious matter free from sulphur.

2. The effects of moisture on coal as tending to promote spontaneous combustion are most evident in those containing iron-pyrites. "The absorption of moisture by mineral substances of laminated or porous structure, through which pyrites are disseminated, promotes the oxidation of the latter by bringing the atmospheric oxygen, which is dissolved by the water, into more intimate contact with the oxidiable material."

3. The breakage to which coal is subjected is largely dwelt on and the different methods of shipping discussed. My remarks in late annual reports on the handling of coal are borne out by this portion of the report.

Dr. Percy and Mr. Abel write that "the more porous and readily oxidisable portions of coal, which are known to be more or less largely disseminated through seams from different localities, undergo oxidation by absorbing atmospheric oxygen, and by the exposure of large surfaces to its action, and the heat developed by that action will accumulate under favorable conditions to such an extent as soon to hasten the oxidation and the consequent elevation of temperature, until some of the most finely divided and readily inflamable portions actually become ignited.

The breaking up of the coal which occurs for a more or less considerable extent before and during its shipment, obviously favors the absorption of oxygen, and consequently increases a tendency to heating."

4. The ventilation of coal cargoes occupied much of the attention of the Commissioners, and the conclusion to which they arrived was that thorough ventilation should not be attempted, as it could never be effected.

In the summary they state that the "breakage of coal in its transport from the pit to the ship's hold, the shipment of pyritic coal in a wet condition, and, especially, *ventilation through the body of coal cargoes*, conduce to spontaneous combustion, even though the coal may not be unfit for conveyance on long voyages"; and "That with a view to guard against *explosion*, free and continuous egress to the open air, independently of the hatchways, should be provided for the explosive gases given off by the coal, by means of a system of *surface* ventilation, which would be effective in all weathers."

Blown-out Shots amd Explosions in Coal Pits.—Mr. Hall, H. M. Inspector of Mines in Lancashire, published an account of some experiments he conducted, with the view of testing the truth of "the opinion frequently expressed that in blasting coal with gunpowder in a mine fairly clear of fire-damp, an explosion may result from the exhaustive action of the blast itself." The conclusions derived from the experiments and observations are the following:—

1.—That flame from a blown-out shot, unassisted by gas or coal-dust, does not travel further than 5 or, at the utmost, 10 yards, entailing little or no danger.

2.—If coal dust be present even in a comparatively damp mine, this flame may travel 50 yards; that in a dry mine of a high temperature, this distance would be greatly exceeded: and since miners, as a rule, consider themselves safe at from 5 to 20 yards from the point where the powder is being used, a blown-out shot, under these circumstances, is a source of great danger.

3.—That the violence of the blast from either gunpowder or fire-damp is much increased when coal dust is present.

4.—That on any partial vacuum being formed in an underground coal working, fire-damp will instantly issue in dangerous quantity; and there are fair grounds for assuming that a shot blowing out in the face of a narrow heading, and setting coal dust on fire in its course, would by its exhaustive action produce such a vacuum, and might cause a serious explosion in a mine practically clear of gas.

5.—Although no experiments have been made directly to test the result of coal dust set on fire in air heavily loaded with fire damp,

there is every likelihood that such an occurrence would be attended with grave consequences.

6.—That it is desirable that any system of blasting coal which entails heavy charges of gunpowder, and an unusual liability to shots blowing out, such as blasting without side cutting or nicking, or using improper material (a) for stemming, should be discontinued.

7.—A large body of flame, such as results from a very heavy charge or from a blown-out shot, is required to ignite coal dust; that in blasting with charges not exceeding 12 ozs., accompanied by the proper preparation of holing and side cutting, there is little liability of this taking place.

As the experiments progressed, the important part which coal dust seemed to play was forced upon the writer's attention. Reference was also made in the paper to an article by Capt. Noble and Mr. Able on "Fired Gunpowder," wherein they drew an interesting comparison between the total theoretic work of coal, which is about 3,400,000 gramme units to the gramme of coal and gunpowder which yields not quite a tenth of that amount. If, therefore, coal could be consumed rapidly it would become an explosive, but as it has to take its oxygen from the air, instantaneous combustion is not possible. The experiments, however, proved that when finely disseminated in dry air it is capable of very rapid combustion. To show this, I will here detail two of the experiments only, though the whole paper might be read by all our coal miners with interest.

A strong iron tube 2 ft. long and 2½ in. diameter was placed at the face of a bricked slant 45 yards in, the sectional area of which was 30 feet. The stemming was done with small debris and the mouth of the tube directed up the slant. Gauze sheets of thin, easily inflammable material were suspended at intervals of 15 feet, by means of cross pieces of timber from about two thirds of the height nearly down to the thill, and in each cross piece small holes (1 in. diameter and 2 in. deep) were drilled so as to face the blast and were filled with fine gunpowder.

First series. Experiment 5.—Fired 2½ lbs. powder; canvas and cross pieces knocked down at 15 and 30 ft., but no appearance of flame.

Second Series. Experiment 4.—Coal dust having been scattered on deals the whole length of the slant, (the hill being very wet) fired 2½ lbs. powder, stemmed with coal dust. Blast very fierce and flame issued from the mouth of the slant, having travelled 45 yards. A metal pipe weighing nearly half a cwt. in the slant was driven 15 yards and a coal tub on the pit heap 75 yards distant was moved by the blast.

So long ago as 1846 Professors Faraday and Tyell wrote: "In considering the extent of the fire for the moment of explosion, it is not to be supposed that firedamp is its only fuel; the coal-dust swept by the rush of wind and flame from the floor, roof, and walls of the workings would instantly take fire and burn, if there were oxygen enough in the air present to support its combustion; and we found the

(a) coal dust.

dust adhering to the face of the pillars, props, and walls in the direction of and on the side towards the explosion, increasing gradually to a certain distance as we neared the place of ignition. When examined with a glass it presented the fused round form of burnt coal-dust, and when examined chemically, and compared with the coal itself reduced to powder, was found deprived of the greater portion of the bitumen, and in some cases entirely destitute of it. There is every reason to believe that much coal-gas was made from this dust in the very air itself of the mine by the flame of the firedamp, which raised and swept it along; and much of the carbon of this dust remained unburnt only for want of air."

Mr. Galloway, H. M. Inspector of Mines, read a paper before the Royal Society, in March, 1876, also on this subject, entitling it

"Influence of Coal Dust in Colliery Explosions."

It will be sufficient here to give only a few extracts, for his paper is a lengthy one. "The accounts of colliery explosions published in this country hardly ever allude to the existence of coal-dust.** This seems all the more remarkable when it is remembered that a mixture of air with several combustible solids in a finely divided state is explosive at ordinary pressure and temperature, and that some serious explosions have been caused by the accidental ignition of very fine dry flour suspended in the air of confined spaces. The subject has attracted more attention in France. In the "Annales des Mines," 1875, there is a paper by M. Vital Ingenieur des Mines. He describes in a very minute manner all the phenomena produced by an explosion in the Campagnac colliery. A shot which blew out the tamping, was fired in one of the working places in a seam of bituminous coal, and was accompanied by an explosion which burnt three men so seriously that they died within a week. No firedamp had been detected in this place at any time, but as the floor was covered with very fine, dry, coal-dust and as the shot was fired at the bottom of the face, and would consequently raise a cloud of dust, it was concluded that nothing but the instantaneous combustion of coal-dust under the influence of the shot could account for the accident.

In concluding M. Vital says:—"Very fine coal-dust is a cause of danger in dry working places in which shots are fired.

In well ventilated workings it may of itself alone give rise to disasters.

In workings in which firedamp exists it increases the chance of explosion.

And when an accident of this kind does occur, it aggravates the consequences."

Mr. Galloway summarizes the results of his experiments and observations as follows:—

1. A mixture of firedamp and air, in the proportion of one volume of the former to 60 or more volumes of the latter, gives no reliable indication of the presence of the inflammable gas when tested in the manner usually, if not always adopted in mines.

2. A mixture of firedamp and air in the proportion of one volume of the former, to 112 of the latter, becomes inflammable at ordinary

pressure and temperature when charged with fine dry coal dust, such as that which is to be found on the roadways in dry coal mines. It seems, therefore, only reasonable to conclude that an explosion originated in any way whatever in a mine of this class, may extend itself to remote parts of the workings where the presence of firedamp was quite unsuspected.

He further writes :—Before leaving this part of the subject it may not be out of place to make a few remarks on the influence of blasting shots in giving rise to explosions in mines. In a paper on this subject published in the Proceedings of the Royal Society, 1874, experiments were described which showed that an intense sound wave, such as that originated by a blown-out shot, was able to pass the flame through the wire gauze of a safety lamp burning in an explosive mixture.** There can be no doubt but that the gases which issue from a shot hole have a sufficiently high temperature to ignite an explosive mixture of firedamp and air if they immediately pass into it.** And it may reasonably be supposed that if a similar shot were fired in various mixtures of firedamp and air the flame would be prolonged more and more as these mixtures drew nearer to the explosive point, somewhat in the same measure as a cap on the flame of a lamp would enlarge under similar circumstances. This prolonged flame might even partake of the nature of a local explosion of firedamp, especially if augmented by the presence of a small quantity of coal-dust, although the existence of any explosive gas might not have been discovered previous to the firing of the shot.

It has often been observed that disastrous explosions happen most frequently during winter months, and during very cold weather.** If it is assumed that the magnitude of some colliery explosions has been increased by the presence of coal-dust in the workings, and that the hygrometric state of the dust changes with the humidity of the air with which it is in contact, then it is obvious that explosions are more likely to occur when the air is driest; for at such times the coal-dust will not only be more easily raised in the air by a local explosion, but it will also be burned more easily that when it contains a larger proportion of moisture. Taking for example the case of a dry mine in which the temperature of the workings is 70° Fahr. In warm weather the air enters at a temperature of, say 60°, and is at the same time saturated with vapor, for there is usually some water trickling down the sides of the main shaft. The temperature rises as the current approaches the faces and attains its maxmium when the newly exposed faces have been passed. The humidity also has been increasing to some extent but never to complete saturation in a mine of this kind. In very cold weather, on the other hand, the current may have a temperature of 30° or less, when it reaches the bottom of the shaft, and since it passes through the same workings, its temperature also rises to 70°. Now, as with a rise in temperature the power of absorbing vapor increases, it is plain that in the latter case, the ventilating current must either obtain an additional supply of moisture from the workings (about $\frac{1}{2}$ lb. for every 1,000 cubic feet of air and that is not obtainable in a mine of the kind) or it must be drier than in the former case at every point of its course. *Prima facie* then, this process of reasoning leads us to the conclusion that explosions

whose magnitude is due to the influence of coal-dust, will happen most frequently during cold weather. It may be said, in conclusion, that the dangers arising from the presence of dry coal-dust in many mines may be greatly diminished by having the coal-dust itself removed as far as possible, and extending the system of watering the roadways, now practiced in many places for the sake of comfort. These precautions are recommended in M. Vital's paper.

ACADIA POWDER COMPANY.—The decided improvement that has been made of late in the quality of the black powder manufactured by this company warrants a notice here as it has a bearing on the economy of mining. The company made in 1876 some 185,000 lbs. of which 49,000 lbs. were sold to collieries, 16,000 lbs. to gold mines, and 100,000 lbs. to other mines and quarries. For reference the following coal companies are named as having used this powder. The Halifax, Acadia, Vale, Spring Hill and Glace Bay Companies, and the General Mining Association.

The Secretary of the company states that the introduction of Dynamite has not lessened the consumption of gunpowder since it has enabled the miner to open ground otherwise impracticable and thus extend the field of usefulness of powder. The sales of the company increased annually since 1873, by 10,000 lbs. in 1874, a further increase of 14,000 lbs. in 1875, and no less than 43,500 lbs. in 1876.

The Company have also recently engaged in the making of soda-powder with a highly finished grain, which is expected to give a sharp local fracture so important in the confined workings of gold mines.

COAL MINING.

The depressed condition which all local trades continue to suffer in consequence of the too well known decline of this industry need not be dwelt on in this report. It will be sufficient to point to the figures in the appended tables, which speak for themselves. The causes which have led to the serious loss of trade which the figures indicate have been detailed in late reports. It has been stated that the trade with the province of Quebec has been checked by the quantities of coal imported in timber ships at merely nominal rates of freight. Coal has even been brought out from Cardiff for 7s. a ton while the freight paid from Pictou, low as it has been considered, has been more than that amount. The reduction in the shipments to the Province of Quebec was no less than 72,451 tons, and within 137 tons of the total decline of the whole trade. This particular market being at the present time an object of some attention, the trade of the past few years is given, and is as follows:—

1873	187,059	tons.
1874	162,269	"
1875	189,754	"
1876	117,303	"

To the United States the exports decreased 18,112 tons and in all only amounted to 71,634 tons. They are now not of so much consequence as the trade with New Brunswick or the islands of Prince Edward and Newfoundland conjoined. The condition of this branch of the trade was so fully explained in Messrs. Perkins and Job's statement in the previous report that it does not call for further comment this year. But bearing on it as of some interest a table is appended of the values of exported and imported coal from and to the British American colonies, taken from Dr. Young's able statistical Reports to the Treasury Department, Washington. With it there is also another table which shows the rise and decline of Nova Scotia's coal trade with the United States.

The falling off of nearly 11,000 tons in the trade with Newfoundland was partly expected on account of the over-supply taken in 1875, and doubtless the long strike at Sydney Mines further reduced the exportation to that Province.

Prince Edward Island took 3,000 tons more than in 1875 for use on the Railway.

New Brunswick is credited with having taken 16,000 tons more than during the year before, but this amount will probably be much reduced when a modified statement is received from Spring Hill. The returns having included among the New Brunswick shipments all coals sold to the Intercolonial Railway, wherever used, because the office is at Moncton.

The Home Consumption has increased 13,000 tons which is altogether due to the demand for slack at the Albion Mines for the manufacture of coke to be used by the Steel Company of Canada.

To the courtesy of Mr. C. J. Brydges, General Superintendent of Government Railways, I am indebted for the statement, to be found among the appended tables, of the distribution of coal along the line of Railway. The statement is of interest, as showing that a trade has been opened as far north as Campbellton, and that the traffic in coal is by no means inconsiderable. In addition to the statement respecting the business of the road, Mr. Brydges states that the Railway Department received for its own use from

Pictou collieries......................	15,145 tons
Cumberland collieries..................	33,456 "
Total...........................	48,601 tons.

The modified statement sent in by the Spring Hill Mining Company shows that the Railway Department took from them 33,224 tons during the year. 1st quarter, 4,894 tons; 2nd quarter, 4,530 tons; 3rd quarter, 10,545 tons; 4th quarter, 13,255 tons. The increased consumption during the last quarters arose from the additional demand which the opening of the road in the summer entailed. And estimating the requirements of the Railway Department for the current year from the figures given above, it seems not unreasonable to suppose that they will amount to no less than 65,000 tons.

The possibility of a trade being opened with Ontario has been considered. But the want of return freights and the competition from

Ohio present what at present appear insuperable obstacles to so desirable an encouragement of "home production."

Mr. McGregor, M. P., Essex, in his evidence before a special committee at Ottawa, in 1876, on the Recent Depression of Trade, stated that he was interested in a colliery in the Shawnee Valley, Ohio, which sent some 75,000 tons into Canada in 1875. The coal was shipped at Sandusky, 160 miles from the mine.

The coal cost at the mine	$0.90
Freight per railway	1.60
Shipping charges	0.25
Cost f. o. b. Am. Cy	$2.75 per ton of 2000 lbs.

Freight, he stated, was about 50 cents by vessel to Windsor, 65 cents to Port Stanley and $1.25 to Hamilton and Toronto. The price in the latter city of good American bituminous was, I am told, $4.50 in 1876, and at Brockville $4.15 per ton. I am further informed on credible authority that the cheap Ohio coal, largely used in Ontario, is much inferior to the bituminous coal of Cape Breton.

The total produce for the year 1876 is given as 709,646 tons. In a foot note to the table on "Coal Produce" in the last report, it was suggested that the produce for the year 1875 was underestimated some 15,000 tons. The quantities given are, in many cases, only estimates, for most of the coal is not weighed as it comes to bank. The collieries believed to return an underestimate are among those which show more sold than produced, but all so showing have not done so, as a few had stocks on hand at the first of the year. Taking the case of the International Company, the difference between the stocks on hand at the end of the years 1875 and 1876 is 1,617 tons, which, added to the produce of 1876, is still some 3,152 tons behind the sum total of the quantities returned as sold and consumed at the colliery. Similarly estimating, the Blockhouse shows a deficiency of 3,199 tons, the Scotia 343 tons, and the total produce from all the collieries, when the difference shown in the stock accounts is added, no less a deficiency than 12,953 tons.

The Diamond Drill, owned by Mr. Logan and others of Pictou, has been further employed in searching for coal in Cumberland County, by proving the further easterly extension of the Joggins series. To show the efficiency and economy of the machine, it may be mentioned that a hole 1.071 ft. deep was bored in 33 working days, the whole time taken up was 45 days. Only 4 men were altogether engaged, and they worked in two shifts. The greatest distances bored at various depths in twenty-four hours were 63 ft., at a a depth of 270 ft.; 34 ft., at 650 ft.; 41 ft., at 785 ft.; 30 ft., at 900 ft.; and 25 ft., at 1000 ft.

A second hole 1,064 ft. deep was also bored at River Hebert. Subsequently the machine was taken back to Pictou County, where it was successfully employed in boring an artesian well.

What to do with the waste coal is a serious question at several of the collieries in Cape Breton. It is felt that while large coal is in such small demand at the present low prices, it is impossible to find a market by water for all the small and inferior coal. That there is little or no local demand, is indicated by the heaps of slack and waste coal about the pits and along the lines of railway at some of the collieries.

A local demand has always been considered the great want in Cape Breton. If only some manufactories could be started that depended on cheap fuel for successful competition with foreign-made goods, total stagnation might be avoided and a greater regularity or, at least, some little occupation furnished to the colliers and laborers during the season of the year when shipping is impossible and the banking of great heaps of coal unadvisable.

Cheap fuel is recognized as the great lever of the age, but, unfortunately, although favorably situated for the importation of raw materials and the exportation of manufactured products, these very same facilities militate at present against the establishment of manufactories in Cape Breton, since the balance of trade is against Canada. An excess of tonnage being required to export her timber and grain and coal, the less bulky and more valuable articles of commerce are brought into the country at merely nominal rates by vessels seeking outward freights. Even such bulky articles as salt, coal, and iron are carried at very low rates.

Mr. J. Lionel Smith, of the Geological Survey of Canada, writes that "ship-owners are often glad to load their vessels with salt for Quebec or Montreal, at mere nominal rates of freight, in preference to carrying dead or waste ballast, which, besides the cost of loading and unloading, involves heavy expense for lighterage. Fine salt from Liverpool is frequently laid down at Quebec at five shillings sterling per ton of 2,240 lbs., while solar, and sometimes coarse salt, are brought out simply as ballast, without any freight charge."

Coal and pig iron are also taken by timber ships for ballast. During the past spring the rates to Quebec were about 7s. per ton, while contracts were at the same time made to carry coal from Pictou to Montreal at $2.12. So that it appears coal was brought across the Atlantic from Cardiff at 44 cents less freight than it could be taken from Pictou up the Gulf. The rates from Pictou fell during the summer to $1.87 and $1.75 per ton, but even the lowest of these rates still placed the Pictou coals at a disadvantage in comparison with Scotch and Cardiff coals.

During the season of prosperity, 1871-73, iron making in Cape Breton was seriously considered, for many excellent beds of ore have been discovered, which could be easily wrought. But while the present condition of trade exists, it is very doubtful whether sufficient inducement can be held out for the inception of so important an industry as the manufacture of iron. In the meantime, however, it may be found profitable to open some iron mines and export ores for admixture and reduction with other ores elsewhere.

The suggestion has been made that at such of the collieries of Cape Breton where the slack coal that is unsaleable and is now either left underground or carted into waste heaps, or used as ballast on the railways, a use might be found for it in the manufacture of salt from

sea water. Certainly several of the collieries could deliver it at the shore for a very few cents a ton for the conveniences, for dumping coal at places where the brine, undiluted by admixture with fresh water, could be pumped into tanks, cannot be exceeded. Discarded boilers could be converted into pans and used experimentally, when if they were found to pay expenses, they could be replaced by properly constructed pans, which would work to much greater advantage.

If it should only be found that the Wootten plan of consuming fine coal under boilers, as has been tried with apparent success by Mr. Hoyt at the Acadia Colliery, is really as satisfactory as it appears to be, it will effect great economy. The method was devised and perfected for the utilization of anthracite coal dust as it is, without any preparation; and so successfully, that the results, it is stated, are almost equal to those obtained from the use of lump-coal.

The plan consists of injecting air into a closed ash-pit by means of a steam jet passing through tubes. The mingled air and steam pass up through perforated plates on which the fuel is spread to a depth of some three inches. The plates are of wrought iron and the perforations are about three-eights of an inch in diameter on the upper face and larger on the lower, and from two to three inches apart. The fuel is frequently rabbled to prevent the formation of clinkers and to aid the removal of the ashes.

Whether the dust from the caking coals of Cape Breton could also be utilized by this method is open to doubt; but if further trial at the Acadia Colliery confirms the present belief in its successful application with the duff of that coal, experiments should be made with that of Cape Breton, since the percentage of waste coal there is greater.

CUMBERLAND COUNTY.

The stimulus given to the coal trade of the county by the opening and extention of the Intercolonial Railway is very marked, as a reference to The Coal Trade by Counties, table A will show. From a vend of 14,153 tons in 1872 it rose to 26,345, to 49,599, to 60,944, and to 84, 528 tons in each succeeding year; the last stated quantity being that of the year 1876. Hitherto the Spring Hill Colliery alone has benefitted by the completion of the railway and its sales have risen to 67,731 tons, the third largest of the past year. The opening of the Spring Hill and Parrsboro' Railway, which is expected to take place during the current year, much of the track being now laid, will furnish additional facilities for the development of this field. A sale of at least 15,000 tons more may reasonably be expected to be made during the current year.

The two companies, the Joggins and Cumberland, mining the Joggins area have ordered a survey of a line of railway from their pits to connect with the Intercolonial Railway at Maccan Station, considering that they may profitably compete with the Spring Hill Colliery for the large and growing trade along the line especially during the winter season.

COLLIERIES.

SPRING HILL.

The coal company having obtained possession of the short branch line from the Intercolonial Railway to the Colliery, now deliver their coal at the junction, working the line with their own engine. This Colliery has an advantage over all others in the Province, in that its sales are little affected by the seasons, the railway requiring supplies in winter as well as in summer ; while, as is very well known, in Cape Breton coal sales are restricted almost entirely to the shipping season.

Near the Byers pit by the side of the railway a shed 300 feet long by 12 feet wide has been put up for the storage of nut and small coals, separated from the slack in the circular screen.

In the pit the west level has now a length of 22 chains, and the east level 20 chains. Going east the dip of the seam increases and at the face of the level it is 36°. The parting also increases in thickness and now measures 17 feet, splitting the seam into two portions, the upper 5 ft. 4 in. and the lower 4 ft. to 4 ft., 6 in. in thickness. Levels are being driven in both.

It is contemplated to open a pit on the 6 ft. seam to meet the increasing demand along the Intercolonial Railway.

SCOTIA.

The working of this Colliery has been as hitherto confined to supplying the local demand; the branch railway to the pits never having been put in such order as to admit of the trucks of the Intercolonial Railway entering on it and affording a connection with distant places.

SOUTH JOGGINS.

The business of the past year was but little better than that of the preceding though a rather brisk trade in the spring promised much more. The irregularity of the trade greatly interferes with the economical working of the seam, which is satisfactorily mined by the system described in the last report when the output is regular.

CUMBERLAND.

The slope for the second lift in the Cumberland seam has been completed and at a depth of 730 ft. levels have been driven east and west. The seam averages some 32 inches in thickness; it is mined at some disadvantage at present both the floor and roof being of fireclay. The bords have been opened 18 ft. wide and an 8 yard pillar has been left between the main and water levels. Shipping has been effected by means of an incline through the cliff to the wharf which has been repaired.

PICTOU COUNTY.

This county felt the depression in the coal trade more than any other, the total sales being less by 61,584 tons than those of the previous year. The shipments show a still greater decrease as the land sales increased no less than 16,508 tons. The leading colliery, the Albion, disposed of 5000 tons more than in 1875, but this excess was in slack converted into coke for the use of the blast furnaces at Londonderry. The whole loss of last year's trade was exceeded by the decline in the shipments to the province of Quebec, the falling off amounting to 63,025 tons. The excess in the Home Consumption 16,586 tons, was met by a further decline of 12,033 tons in the exports to the United States, an absence of shipments to South America, and a slight decrease in those to New Brunswick and Newfoundland. Some 3,000 tons more were sent to Prince Edward Island, though the quantity of slack sent was about an equal amount less ; the difference, 6000 tons, being just the quantity contracted for by the Island Railway Department. The price, it is understood, was $3 a ton delivered at the three ports of Georgetown, Charlottetown, and Summerside, and freight for the whole quantity was had at 80 cents a ton.

Freights to all points were much lower ; in the coasting trade to Halifax there was a decline of 15 cents from $1.30 in 1875 ; to Boston they declined from $2.25 to $1.90 a ton ; to Portland to $1.80 and to Montreal steamers made contracts at $2.12½, while odd cargoes were taken at $1.75, and sailing vessels averaged $1.87½ per ton.

COLLIERIES.

ACADIA.

In the pit the dead work has been continued and the faces of the levels on both sides in the lowest lift are in some 17,000 ft. from the slope, the distance between the barriers on these levels will be about 5000 ft., the extreme limit that the area will allow. The roof on the north side has given more trouble than hitherto in the working, and in consequence the pillars have been increased to 15 yards in thickness. A second plane-way on this side has been broken off, and on the south side a second is now ready 700 ft. inside the first, so that the lift is well forewon and in a condition to throw a large quantity should a demand arise. A proposed modification of the plane-way was mentioned in the last report by which the back-balance should travel in a four by four ft. way in the lowest bench of the seam. This has been done in the newest plane-ways and it is hoped it will enable a larger per centage of the coal to be recovered when the pillars are brought back.

A barometer is now kept in this pit and regular observations are taken and recorded. By the mining law of Great Britain this is made compulsory, but it is not so here, and only the General Mining Association, the Halifax and Vale Companies besides the Acadia require it.

On the surface two experiments having an important bearing on economy of colliery consumption and marketable coal have been made. First, the consumption under the colliery boilers of the "duff," the waste coal from the screened slack, spoken of elsewhere as the Wootten method of utilizing waste coal: Second, the cleansing the duff, which averages about 8 per cent. of the total quantity mined of the shaly portions. This is effected by washing in a long trough. Intermittently duff is shovelled in at the upper end, the sluice gate opened, and the material as it is carried along by the current of water stirred with a rake to prevent the unequal settling of the heavier and stony particles; then the water is turned off, the sediment shovelled out of the trough and the washed coal collected from the receptacle at the lower end. The operation is then repeated. It was found that one-half of the duff was marketable coal and excellent for blacksmiths use. Sufficient trial was not made before frost set in to test the commercial value of the experiment.

ALBION.

The present engines at the Foord pit have slide valves which although fitted with friction rollers, are heavy to handle, and troublesome to keep in order. New engines have been obtained to replace them which are fitted with double beat Cornish valves, and work without the slightest strain. These new engines are 2 inches larger than those they replace, and they are the only pair of 38 inch cylinders in use in the Province. Being fitted with Cornish valves, one man may easily tend them, and more securely than two could the others with slide valves.

The heavy fault met with in the so-called north level of the Foord pit, about a mile from the pit bottom, has been at length pierced by a drift 110 yards long. Beyond it the coal is found lying apparently regular, but turned round about 100° and the level now has a north-easterly course. In the deep seam, opened by a pair of stone drifts, from this pit a pair of headways has been put up to the rise 150 yards, and levels started to the north to open that seam. A scale of 13,000 feet of air ventilates the new winning. To connect with these workings, that those of the Cage pit may be drained of water by the Foord pit engine, a pair of drifts are being driven towards them from the bottom of the Cage pit workings. The drifts are being put down in the top coal which has a thickness of 3 ft. 6 in. This coal rests on 9 in. of cannel which in its turn overlies the stone parting, of 1 ft. thick, that separates the upper from the main portion of the seam. The bed of cannel is of good quality, but is of less thickness elsewhere and only 1 in. thick where cut by the drifts from the Foord pit.

Hitherto much trouble has been experienced during cold weather by the formation of ice in the winding shaft, which is the down cast for the air. To prevent ice from forming on the slides and obstructing the passage of the cages, Mr. Hudson has put upon the bank-head a hot-air stove, which he finds warms the intake sufficiently for that purpose.

In the Cage pit the lower levels are being driven both north and south. Off that on the north side one counterbalance is already at

work, while two are in operation off the upper level on the same side. As will be seen in the table on Ventilation, the volume of air circulating in these workings has been increased to 30,000 cubic feet.

The dip inclines already mentioned as in course of being driven to connect with the new winning from the Foord pit, are now down over 200 yards and will probably make a connection sometime during the spring.

INTERCOLONIAL.

Number 4 slope, which was opened after the explosion of 1873, was worked until last autumn. It is now closed. Operations have been chiefly conducted from slopes numbers 1 and 2. All the old workings, except the extensions of the slopes to the extreme deep, have been reopened. Most of the available pillars left in the previous working have now been removed.

NOVA SCOTIA.

In the pit of this Company the innermost headway is now in some 1800 ft. on the 8th north level. That level is in some 500 ft. further, and is still being driven to forewin the seam. It passes through four small troubles, which altogether throw the seam some 20 ft. to the west. The actual workings have been from the pillars and rooms off the headway from the upper level, and in rooms off a headway between the 10th and 8th levels. The 10th level is in some 600 ft., the headway starting at a distance of 450 ft. Eight rooms are broken off on each side of the headway.

It is calculated that some 15,000 tons still remain on the south side between the slope and the barrier bounding the Acadia area.

VALE.

A shed has been put over the bank-head, which answers the double duty of protecting the banksmen and enabling work to be continued in stormy weather. In it a stove has been placed to warm the intake and prevent the formation of ice in the slope. It also gives additional comfort to the men, a matter that is being more and more attended to, as one colliery adopts improvements introduced by another. A few years ago it was the exception for the stokers attending colliery boilers to work under cover, now it is the reverse, for a shed over boilers protecting them from the weather is found economical of boiler-power.

Mr. Greener, the manager, believing that profit may be derived from the experience of others, is on the lookout for improvements elsewhere in little as well as great matters. Even the greasing of a wire rope is worth attending to if its life is hereby prolonged; and on long inclines the wear and tear of a rope occasions no inconsiderable expense. Mr. Greener has used a new mixture which is said to be a great protection to a rope, as it does not get hard and dry; certainly it appeared to most effectually coat the rope at the Vale pit when seen by me a week or two after its application. To the ordinary mixture

of tar and grease a handful of lime is added. Through this mixture, while hot, the rope is run and then through a box full of sawdust, which forms a coating not easily removed. This rope is of steel.

The slope has been thoroughly drained and so strengthened by additional timbers that all signs of subsidence have ceased.

The fault met with in the workings on the west side of the pit increases in width to the deep. In the upper level it was 7 yards, in the lower it is 11 yards. Where the workings reached the fault, the pillars have been brought back, much of the timber being drawn at the same time. The capacity of the pit and the facilities for output have been much increased, and are now equal to 1000 tubs a day. With other collieries of this county, this colliery has been unable to meet the demand for screened slack.

CAPE BRETON COUNTY.

Less trust in specious hopes of a speedy resumption of activity in coal mining was placed by the working men of this county during the year than in 1875; and the wisdom of the many who sought to eke out a livelihood by such planting and fishing as they could command was shown in the result of the year's business. The total coal production of the county was only 304,102 tons, and the sales of round coal decreased 40,256 tons and were *less than half* of what they were in 1873. The sales of slack, however, were in excess some 4,362 tons, the shipments of that quality to the United States being increased. The decline of 11,039 tons in the supply of the Home Consumption, outside the local demand which shows a small increase, may be accounted for by the decreased production at Sydney Mines in consequence of the two months' strike in early summer. Attention was called in the last report to the unusually large stocks of coal held at St. John's, Newfoundland, in the winter of 1875-6, and as was expected in consequence the shipments thither in 1876 fell much behind those of the previous year. Much of the coal that went to Montreal was for the use of the gas company of that city. The Montreal gas company annually consume some 30,000 tons altogether, of which 5,000 tons are of cannel coal imported to enrich the quality of the gas. The company find that Provincial coal yields in summer time 17 candle gas.

COLLIERIES.

SYDNEY.

The strike of the workmen at this colliery has already been mentioned. It lasted from May 27th until August 1st. Regarding it from the most confined and favorable point of view it can only be considered a most ill-advised proceeding, for the workmen gained not a single concession besides losing their time and consuming their savings. Looking at it also in the same light, the time was most inopportune, for competition was keener than in former years for the

declining market, and no permanent advance in wages could possibly be expected under such circumstances. Strikes have been proved time and again all the world over to result most disastrously for the men themselves. In the present case had the slight concession asked for been granted it would have taken a long time for the men to recoup themselves for their loss of two months labor. The strike lost to the county the circulation of $45,000 which would have been paid out in wages alone, besides the loss of business which the shipping, driven from the port, would have given. In 1864 a strike at this colliery lasted for thirteen weeks and ended unfavorably for the men.

During the strike operations at the New Winning were discontinued. They have since been resumed and the winding shaft, 13 ft. in diameter, is expected to be down to the coal by next June. Since the water bearing strata have been pierced and tubbed the sinking has been continued dry. The pumping shaft now completed is 11 ft. in diameter and is 709 ft. deep to the sump bottom. It is temporarily fitted as a drawing shaft. The staple shaft completed is 389 ft. deep and 6 ft. 3 in. diameter.

The following memorandum of tubbing used in the three shafts has been given by Mr. Brown; it is of interest as showing the additional expense entailed by the heavy feeder of water met with in the sinking:—

	Depth tubbed.		Segments.		lbs.
Winding Shaft	..275 ft., 6in	took	..1,269	weighing	..658,724
Pumping "	..284 ft.	"	..1,168	"	..569,639
Staple "	..283 ft., 3in	"	.. 736	"	..323,975
	842 ft., 9in		3,173		1,552,338

A self feeding boiler grate, known as Jukes' Furnace has been for some time under trial, and Mr. Brown considers it a success in saving labor and fuel. The coal is dumped into a hopper which has its mouth over the end of the grate that projects beyond the front plate of the boiler. The grate is endless, made of short plates linked together, and is slowly driven by a small engine. The fuel at the front end of the grate ignites from that already in a state of combustion, and by the time it reaches the back end it is consumed. The ashes drop off as the grate continues to revolve.

The new shipping wharf is now so far completed that it can be used for vessels of large draft. It will ultimately be fitted with balanced platforms and shoots. Flat bottom wagons with end doors will take the place of the hopper wagons now in use, and much breakage of the coal avoided. The advantages attending the careful handling of coal have been touched on in the two last reports. It will be sufficient here to add that any one interested in the subject may find information bearing on it in the report of the royal commission on the Spontaneous Combustion of Coal in Ships.

LINGAN.

A new winding engine is in course of erection at this colliery. Its dimensions are given in the table of machinery and a reference made to the one which it replaces.

Besides the ordinary pitwork part of the slope has been retimbered and the roads opened through the falls occasioned by the fire in 1873.

During the winter a headway and a level on the north side were driven; and in the summer, besides this narrow work, rooms were worked off the level, and a few pillars on the south side were removed. The level on the south side is in 28 chains.

COLLINS.

The facilities for mining at this colliery have been largely increased; the slope has been finished and has now a total length of 1000 ft. The new engines, etc., are described in the general table of machinery. The tubs adopted hold half a ton, and the surface cars two-and-a-half tons each. The seam varies in thickness from 5 ft. 3in to 5 ft. 6 in., and the coal, judging by the business, takes well in the market. To aid the shipping a balanced drop has been contrived by Mr. Scott, the manager. The car runs on a balanced platform at the end of the wharf, which rocks forward on hinged posts so that the weight of the coal takes the platform and wagon forward and downward over the hatch of the loading vessel. When the coal is discharged the counterbalances take the platform back to its original position. The movement is controlled by a brake. By this contrivance the fall of the coal into the hold is diminished by 8 to 10 ft., but it still has a fall of no inconsiderable depth until a cone of coal is formed up to the combings of the vessels' hatch.

RESERVE, EMERY AND SCHOONER POND.

These collieries of the Cape Breton Company (Limited), mined no coal during 1876. The pits at the Reserve and Emery were kept pumped out. The coal sold was what remained on the banks after the previous years' shipments were over. The Schooner Pond coal had been out for two years and yet sold freely at a fair price for steam purposes. This speaks well for the character of the coal. Some explorations have been made by Mr. Rumble with a view of testing the value of other areas belonging to this company.

VICTORIA.

The workings have been chiefly on the east side of the slope from the level to the barrier. The east level is in some 1600 feet.

GLACE BAY.

The operations during the winter were confined to narrow work. The level in the Harbor pit was extended some 625 ft., giving it a total length of nearly 4000 ft. The main innermost headway is an incline about 1000 ft. in length. It is hoped that the coal for the current year's trade will be taken from the Sterling pit workings, for during the summer the pumping pit was drained and a place driven up under the unfinished winding shaft and a bore-hole was put down to it to carry off the water, that the sinking might be continued dry. This

was done, and the work of opening out a pit begun; but, unfortunately, in Christmas week, the pumps were drowned out, and mining consequently stopped. The detension is reported to be but temporary.

CALEDONIA.

This colliery did a steady business, considering the general dullness of trade, during the season. No new work was done beyond the necessary maintenance. The system of storing the coal underground has been continued, thus giving more work to the miners than would be given were banking practiced. It is considered that by stowing the coal back in the rooms behind the headmost crosscuts that the coal deteriorates much less than when exposed to every alternation of temperature, to frost, rain, and sunshine, as it is on the surface. The loss and expense of lifting is perhaps also diminished when the quantity so stowed is not very great. As has been before remarked the system is not one that can be extensively adopted.

Many of the rooms to the rise have been discontinued and but few pillars have been removed. The main levels to the west are now within 5 chains of the boundary and as the boundary is the tortuous course of the Little Glace Bay brook, an additional thickness of barrier will be left to guard against the waters of the brook percolating into the workings in the event of any subsidence taking place.

GARDINER.

This pit was kept pumped out, but no coal was drawn from it in 1876.

INTERNATIONAL.

This colliery did not work during the winter, but opened the pit in the spring and mined from the bords both above and below the water level.

ONTARIO.

The mining has been in the lowest lift on both sides of the slope, which is in a distance of 510 ft. on the dip of the seam. The levels extend 400 ft. towards the shore and have about 200 ft. more to go before reaching the barrier. An additional thickness of barrier besides that required by the lease has been promised to be left to guard against any subsidence making a communication with the sea. The danger is of so serious a nature that too much care cannot now be taken to prevent the too near approach of the workings to the shore. The annual denudation of the cliffs being considerable, it is said, as much as 8 in. a year, subject of course to be accelerated or retarted by local conditions, the necessity for considering the future interests of such a property as this is very apparent.

BLOCKHOUSE.

This colliery was idle during the winter, and when working during the shipping season about one-third of the produce was taken from

pillars and the rest from the solid. Eight new boilers replaced those hitherto in connection with the engines at the shaft and incline.

GOWRIE.

Operations were chiefly confined to that section of the pit above the upper level, lying 300 yards to the north of the self-acting incline, which lowers the coal from the upper to the lower level on its way to the shaft. The plan of working in this section has been before described; a ten yard bord is taken up, the centre of which is stowed with slack and stone a road being left on both sides. The pillars which are 6 yards thick are worked back within one of the face.

SOUTH HEAD.

The Returns show that a small quantity of coal was mined from this area.

VICTORIA COUNTY.

Some explorations for coal were made at Big Baddeck but the indications as yet exposed are not very encouraging.

NEW CAMPBELLTON.

The produce of this colliery has been small. An adit is being driven in the seam to carry off the water made in the rise workings, when complete it will have a length of 2200 feet. More attention has been paid to the ventilation. On the surface an $1\frac{1}{2}$ in. pipe has been laid for 1500 ft. from a dam on a brook to convey fresh water to the boilers.

INVERNESS COUNTY.

Some explorations are said to have been made about Broad Cove, but no return has been sent to this office.

PORT HOOD.

This new colliery labors under the great disadvantage of having no suitable shipping place. The destruction of the sand bar connecting Smith's Island with the main land of Cape Breton exposes the harbor of Port Hood to the north and west winds, and no shipments are in consequence possible in the autumn from the public wharf, which is at present used. Still considering the want of facilities this colliery has established a small trade, and the coal has obtained a good reputation as a house and steam coal.

At a depth of 660 ft. on the slope a pair of levels have been driven to test the quality of the seam, but no work has been done above that point, the thickness of the measures overhead giving no more than the minimum of cover required by that clause of the mining law which

relates to submarine workings. The future interests of a colliery in the position that this is are so enormously disproportionate to any present small advantages to be gained by an infraction of this clause, that attention to the very letter of the law in this respect cannot be too strictly enforced.

A description of the machinery erected at this mine is given in the appended tables. The boilers are hung in one set from three baulks of timber. The rope is of steel.

COLCHESTER COUNTY.

The locality from which the 12 tons, shown in the tables to have been sold in this county, were extracted, was fully described in the last annual report.

COLLIERY MACHINERY.

Scattered statistics respecting the machinery in use at the several collieries have been published in the annual reports as engine by engine have been erected. In the Canadian Geological Reports of Progress, statistics somewhat similarly arranged, may be found inserted in papers relating to the several coal fields. A comparison of the annexed tables with the data given in the report 1872-3, on the Cape Breton coal field, will show some discrepancies, and reference is here made to them lest the general accuracy of the figures given in the annexed tables might be questioned. As the following statements were courteously furnished in writing by the several managers, in response to special enquiries, they may presumably be taken as the more reliable of the two; still inaccuracies may have inadvertently crept in, though much of the data has been verified.

VENTILATION.

To control the ventilation of the underground workings, furnaces are in general use. On the same principle of rarifying the ascending column of air, one or two pits are regulated by turning the exhaust steam from underground engines into the upcast. Only two have the air which courses through their workings controlled by fans driven by steam engines on the surface. The air is exhausted. The fan at the Foord pit is among the largest made, though it is surpassed in size by some in England. The advantages which fans possess over furnaces may here be mentioned as not irrelevant to the object of these reports. Among them are the following:—Power of speedily increasing the volume of air in cases of emergency, of permanently increasing it when forethought has erected a fan of ample size, of giving a large circulation in extended shallow workings where a high heated column is unattainable, and lastly of extracting explosive mixtures without danger, though this may be also attained in fiery pits by conveying the returns by a dumb drift into the upcast above the furnace and supplying the furnace by a scale of fresh air. With them there is also

no danger of setting the coal on fire, as furnaces, even thought to be well contrived, have been known to do. Neither of the Fans erected at the Foord and Drummond pits are required to work at their full capacities.

At the Spring Hill Colliery the furnace described is at the surface, the least advantageous position for a furnace to occupy under ordinary circumstances. The temperatures given refer to the East slope—the furnace being at the Hall pit—and the upcast temperature is obtained from the waste steam from the direct acting steam pump. This steam pump, by the way, now exhausts into the suction pipe. The exhaust steam from the steam pump at several other collieries also assists the ventilation by heating the return air course. At the Gardener Colliery the ventilation entirely depends on the heat of the waste steam.

In the winter season at many pits the natural ventilation is sufficient and artificial means are only required to keep the currents constant. At the Foord pit when the external air is 33° Fahr., the current has a temperature of 47° at the bottom, 53° at the working face, and 55° at the bottom of the upcast to the fan. The highest temperature in any return air course is recorded of the Reserve pit, 72°, an increase of 10° above that of the external air, and as the workings are shallow with a natural temperature of about 45°, this increase must be due to the warmth from the bodies of the men and horses, and from the lights, etc.

The downcast temperatures indicate that the observations were taken at different seasons of the year and that therefore they cannot readily be compared together. In noting the increase of temperature due to the working of the pit, it is necessary to consider the influence of the natural temperature of the measures according to the season of the year and the condition of the mine, whether wet or dry. The figures in the column Least Sectional Area of the Air Course do not represent the average area but the size of overcasts or cross cuts through which the air is coursed in any return air way. The last column in the table on Ventilation shows that the total quantities of air circulating per minute are in most cases considerable, when the extent of the workings is considered, and sufficient if only the air is advantageously conducted round the faces. As an aid to the proper distribution of the air it may here be repeated that under-managers would find a working plan with the courses of the air clearly defined a great assistance.

The dimensions of the various furnaces show a diversity of style, of questionable advantage in some cases, as in those of which the dimensions vary greatly from the type found to answer best in England. Professor Warington W. Smyth in his lectures before the Royal School of Mines, states:—"Take the case of a pit of not very large size in North Staffordshire. we shall find the furnace constructed of side walls 3 ft. high, then the fire bars supported on a girder of iron, and above that an arch 3 ft. high, the breadth of the whole being 6 feet. * * * In the large Clay Cross pits the furnace has a width of 9 ft. from wall to wall, the girder is put in at a height of 4 ft. 6 in. and there is a height of 5 ft. above the bars. As a rule 3 ft. beneath the bars appears to be sufficient."

At the Vale Colliery there are two upcasts, one on each side of the slope, of the same size with furnaces of the same dimensions. The second, which is just complete has a vertical height of 128 ft. and is not at present required during cool weather. In the Queen pit Sydney Mines two furnaces of the dimensions given in the table stand side by side, the second one being reserved for when occasion requires additional ventilation.

WINDING ENGINES.

The most powerful pair of engines of this class is at the Foord pit, with 38 in. cylinders, fitted with cornish double beat valves. These have lately replaced a pair of 36 in., similar to the pair at the Lloyd's Cove pit, at Sydney Mines. Both these engines have 18 ft. drums with brake rims 25 ft. in diameter. The dimensions of these drums are surpassed by those of the new pair of engines erected at the Lingan Slope, with a 21 ft. drum. The cylinders of these engines rank third in size. The engines at the Victoria slope, are the fourth largest pair in use with a nominal horse power of 104.

The only vertical engine now remaining in use is the one at the Queen pit. Until the present winter the winding engine at Lingan was a vertical one with a 28 in. cylinder and 6 ft. stroke. This engine was the first high pressure engine set up in Cape Breton and was imported from England in 1838. It was used at the Jacob's pit, Sydney Mines, before it was erected at Lingan, in 1860. Most of the engines at shafts are attached direct to the drum shaft, those at slopes are nearly all geared by toothed wheels, though a few have friction gearing. The crown wheel of the Spring Hill winding engine differs from the rest in having wooden teeth which cause it to run less noisily.

The largest winding engine in England is at Silksworth Colliery; it has two horizontal 48 in. cylinders. 6 ft. stroke, non-condensing.

More of the collieries are worked by slopes than by vertical shafts. The longest slope is that of Lingan though the underground engine planes at both Sydney Mines and the Cage pit are longer, one of the former is 1100 yards in length. The underground engines are supplied with steam from the surface.

The steepest seam open is the Ross (41°), worked at the Victoria colliery. The Black Seam worked at Spring Hill dips at an angle of 36°. Other workings dip at 33°., 29°., 23°., etc. The shallowest slopes are those on the Phelan and Emery seams dipping at so slight an angle that the cover at the sump is light in comparison with the length of the slope.

No conical drums are used, all being flat, and the round ropes bed themselves in the lagging. At a colliery in the North of England where great care was taken with the grooves on the drum the life of the rope was greatly prolonged.

Few flat ropes are in use and only two or three of the round ropes are of steel.

The deepest shaft is the Foord pit and it alone is as yet fitted with two deck cages. The second deepest is the Lloyd's Cove pit and when fitted up it also will have two deck cages.

Most of the boilers are plain cylindrical of small diameter working

with a pressure of 50 lbs. to 60 lbs. of steam, and nearly all are fired externally. At Sydney Mines, "Jukes' Furnace," a self-feeding boiler grate has been adopted and Mr. Brown reports it as a success in saving labor and fuel. At all the other collieries the ordinary hand firing is practised except at the Acadia where Mr. Hoyt has lately introduced the system of having jets of steam under perforated plates in the place of fire bars and consuming the fine coal dust and waste with economical results.

PUMPING ENGINES.

Direct acting steam pumping engines have been largely adopted and more than half the collieries are now drained by their aid, as a reference to the table will show. Their advantages and disadvantages have been mentioned in previous reports and need not be here recapitulated. Some of the auxiliary pumping engines are not given in the table, as the steam pump which drains the deeps of the Cage pit workings. This engine receives its steam through 1000 yards of jacketed pipe at a pressure of 24 lbs.; the pressure on the boiler is 60 lbs. which is reduced to 50 lbs. at the receiver underground. The direct acting steam pump in the Vale pit receives its steam through 980 ft. of unprotected pipe and the pressure is reduced from 60 lbs. on the boiler to 43 lbs. at the pump.

At the Emery colliery two pumps are placed side by side. The Gardener also has two, keeping the second in reserve for emergencies. The second pump draining the lowest lift at the Victoria pit is not entered in the table. It is about the same power as the one mentioned.

The largest set of pumps is at Sydney Mines, with working barrels 20 inches in diameter. The largest direct acting steam pump is at Spring Hill, forcing water in one column to a height of 427 feet. This duty is surpassed by the pump at the Nova Scotia colliery which discharges at a vertical height of 560 feet.

GOLD MINING.

Judging by the past records of this country, it would seem in gold mining no great prizes are to be drawn by lucky finders of large nuggets, valuable washings, and fabulously rich veins, but that success is more likely to attend the diligent explorer, and the systematic and economical worker. It has certainly been so with our fortunate gold miners. Luck, beyond the finding of the profitable lead, has had little to do with their good fortune, but it has resulted from attention to their business and studied economy. Many of the failures of six or eight years ago were due to the reckless style of operations and to extravagant management. The cost of many supplies was also very heavy and the profits made by dealers disproportionately large. As an instance, when quicksilver was selling at Boston for 80 cents a pound, $1.50 was asked for it here in Halifax. Now, to make most

of the gold mines open pay it is necessary to save in every department. The success of the tributers in mines that companies failed to work profitably, shows what can be done by the effective employment of labor. Economy has also to be looked to in the matter of supplies, and some experience of Mr. McClure is worth recording.

He required an indian-rubber belt 12 inches wide and 46 feet long, the price asked per foot here was $1.10. Dissatisfied with the price, he obtained such a belt in Boston, which, duty and other expenses paid, cost him delivered here only 69 cents per foot.

Another instance is of sufficient interest to mention. Hitherto, double-tape fuse has alone been considered water-proof, and it sells at 22½ cents per coil. Mr. McClure obtained some single tape from Toy & Bickford's manufactory in Connecticut which cost, expenses paid, 12 cents a coil, and it, he assures me, is water-proof. I am informed that lately single tape fuse has been sold in town at 15 cents a coil. The cost of drill steel is another large item of expense to gold miners, and the present price is some 15 cents a pound. It is hoped that when the Steel Company of Canada have their works fairly established, they may supply this material to the actual consumers at a much less cost.

Small quantities of powerful explosives, somewhat similar in their action to dynamite, have been imported for experimental purposes. I have heard of both mica powder and rend-rock being tried, but of their comparative advantages I am unable to write positively, no one being sufficiently experienced in their use to judge of their efficiency compared with dynamite. Mr. McClure, who has tried rend-rock, believes it is good for many purposes, as it can be used in wet ground. It is, however, more bulky than dynamite, but then it can be sold for 50 cents a pound, while dynamite costs 50 per cent more. The high price of dynamite militates largely against its extended use, and although its special advantages are well known, there is little doubt but that the less cost of other high explosives bringing them into competition will restrict future sales in this country. The introduction of dynamite—first advocated in my report for 1872—has unquestionably been of great service to the gold miners, as it has enabled many mines to be kept open which could never have been worked with common black powder except at a loss. Possibly the agents of the British Dynamite Company may see their way to importing at a less rate of freight than hitherto, and also get a concession from the Government by having it specially rated at a lower duty than 17½ per cent. ad valorem. They inform me that the item of freight alone averages 5 cents a pound, and that notwithstanding the high price that dynamite costs, they have disposed of some thirty-five tons within the last three years. While on the subject of explosives, it may not be out of place to mention that the Acadia Powder Company are now manufacturing a blasting powder that is rapidly winning its way into local favor. Reference will be found elsewhere to the business of this Company.

As the process of amalgamation in the battery and on copper plates is the only one practised in this Province, and as in parts of California another process is preferred, the following extracts from a paper on the practice at the Grass Valley Mills are reproduced as of

possible interest to the gold miners and mill-men of this Province. The paper referred to was written by Mr. G. F. Deetken and published in Commissioner Raymond's report on the Mineral Resources West of the Rocky Mountains, 1873, and to which report those interested are referred for drawings and descriptions of the machinery employed.

TREATMENT OF GOLD-BEARING ORES IN CALIFORNIA.

The gold-bearing ores of California consist chiefly of quartz—in but a few instances of slates.

The gold is usually disseminated through the rock in small metallic particles, sometimes scarcely visible to the naked eye. Sulphides of iron, lead, copper, and zinc, and arseniurets, are frequently associated with the gold; but these rarely constitute more than 6 per cent. of the rock, and average, perhaps, only one per cent. Galena is considered the most favorable indication of the presence of gold in the quartz. Most of the gold contained in the sulphides appears to be in the metallic state, as the greater part can be separated by a grinding operation in a porcelain mortar, combined with a careful washing off of the slimes. To extract the gold from these ores, they are subjected at present to a mill process, which, with necessary machinery and apparatus, will be described in these pages.

The rock is generally delivered at the mill free from any large amount of waste. The small quantity left by the miner is thrown aside at the mill. It consists, according to the mineralogical character of the walls of the vein, chiefly of talcose, chloritic and clay slates, serpentine, diorite, and granitic rocks in general.

The treatment of the quartz comprises the following operations:

1. Crushing it by means of rock breaker and stamps, and amalgating the freed gold, outside the battery, by various contrivances.
2. Concentrating the freed gold lost by these operations with the auriferous sulphurets.
3. Extracting the gold contained therein by chlorination or pan amalgamation.

1.—CRUSHING AND FIRST AMALGAMATION.

Previous to a final pulverization in stamp-mills, the quartz is broken to a small and somewhat uniform size by rock-breakers. (For a description of Blake's rock-breaker, see Mining Commissioner's report of 1870, page 648.) The jaws are usually set from 1 to $1\frac{1}{4}$ inches apart, opening out to $1\frac{1}{2}$ to 2 inches. The shoes are of white iron, cast in sand and slowly cooled. The rock-breaker discharges upon a platform in front of the feed side of the battery.

(The arrangement of the battery of a stamp-mill is then described and illustrated by plates.)

THE OPERATION OF THE MILL.

The rock is delivered from the mine in cars, containing each, say, 13 cubic feet, of a weight of 1,300 pounds, in front of the rock-breaker. At custom mills the quartz is delivered in wagons, the

crushing being paid by the load, consisting of about 35 cubic feet of a weight of 3,500 pounds, including moisture.

The object of crushing being to liberate the fine particles of metallic gold disseminated through the quartz, so that they can be collected or caught by blankets and subsequently amalgamated; a fine crushing is always desired. Fast crushing is not prejudical to the saving of the gold in this process, the gold being leisurely collected and amalgamated, outside of the battery after crushing.

This is a distinguishing feature of the blanket-process as compared with the method of amalgamating in the battery while crushing as practised in Nova Scotia.

The rock-breaker, making 170 strokes of ¾ of an inch a minute, is capable of a preparatory crushing of 72 tons of quartz, the crushing capacity of a heavy 30 stamp mill, in twenty-four hours. The shift at the rock-breaker consists of ten hours, no night work being done. It increases the crushing capacity of a mill, on an average, 20 per cent.

Only the coarser quartz is passed through the breaker; the finer, containing always a quantity of wooden splinters from the mine, is crushed by itself in a separate battery. The splinters cause a loss of efficiency of the battery, by clogging up the screen holes. The screens require, in consequence, a greater amount of attention.

The feeding of the battery is done by hand, and is regulated so that there shall not be more than 2 inches of sands between die and shoe at the end of every drop. A good feeder knows to some extent the requirement of the battery by the clear or dull sound of the stamp stroke. The number of drops of the stamp per minute varies from 50 to 70, the lesser number corresponding to the heavier, the greater to the lighter stamps. The weight of the stamp varies between 600 and 900 lbs.; most frequently it is between 750 and 850 lbs. A battery of 20 stamps weighing 850 pounds per stamp, with 61 drops of 10 inches per minute, crushes 40 tons of quartz in twenty-four hours, without the aid of a rock-breaker, while a battery of 20 stamps weighing 700 pounds per stamp, with 68 drops of 10 inches per minute, crushes 32 tons of the same rock; a No. 6 screen being used in both trials.

The proportion of power necessary to do the work of the heavier to that of the lighter stamps is as 850x61 : 700x68, and the work expected therefrom would be as nearly 35 tons for the heavy, to 32 for the lighter stamps. But the former crush 40 tons, an additional quantity of over 5 tons in favor of the heavy stamps. When the rock-breaker is used in connection, the proportional result is nearly the same. The limit of weight has never been determined experimentally, though stamps are satisfactorily employed weighing over 900 pounds with a 10 inch drop. These results are on mill-rock of average hardness.

The quantity of battery water depends upon the amount of sulphurets or black-iron sands in the quartz. It averages half a cubic foot per minute to the stamp. It must be sufficiently large to move the crushed sands over the blankets without allowing them to permanently settle upon them. Less grade to the blankets and more water is preferred to the reverse condition.

The bottom edge of the lower screen holes is 3 inches above the

dies when new. The battery water during the crushing has a wave motion along the screens. The water has its natural temperature while passing through the battery and over the blankets. Further on, when passing through the rubbers and copper plates, it is warmed somewhat by the influx of hot water from the amalgamators.

After leaving the battery, the crushed sands are distributed by spouts on two sets of sluices covered with woolen blankets. There are three sets of blanket sluices for every 4 or 5 stamp battery. Each set consists of two sluices made of 1¼ inch planed sugar-pine boards, one 10½ feet long, the other 5½ feet with a drop of 3 inches between them. They are from 16 to 17 inches wide, with sides of two inches in the clear, and have a grade of ¾ inch to ⅞ inch to the foot.

The blanketing is manufactured for the mill trade, shorn on the lower side, with the nap on the upper. It weighs 8-10th. of a pound per running yard.

The upper sluice carries two strong blankets 21 inches wide and 5½ feet long each, the upper overlapping the lower about 6 inches. The lower sluice carries only one blanket.

The flow of the pulp is over two of the three sets of blankets, the third one being kept in reserve for use when washing the blankets of either of the others. The upper blankets which catch the bulk of the gold, are washed every twenty minutes, the lower one every two hours. The washing is performed in two tanks, used alternately. They are made of 1½ inch planed pine boards, and have a horizontal section of 3 by 4 feet, tapering towards the bottom. They are 2½ feet deep, and are provided with inclined shelves for the blankets and plug holes for the discharge of water after the settling of the blanket washings. The water used in these tanks is warmed in a heater by the waste steam.

The quantity of crushed sands passing over the blankets sluices of a 5 stamp battery is 12 tons in twenty-four hours, while the blanket washings, consisting of gold, sulphurets, iron and quartz sands, vary considerably in weight with the percentage of the metallic contents of the rock. The average quantity of dry blanket washings may be estimated at 12½ per cent. of the rock crushed. They are introduced by the blanket washer into a box in front of the amalgamators, from which they are swept gradually into the same by a current of clean, heated water of a temperature of from 100° to 130° Fahr.

The Atwood amalgamator, which is used, consists of two hollow cylindrical troughs, 17 inches long and 4 or 5 inches deep, of wood or iron, which are filled with pure quicksilver, over which the blanket washings are directed. The gold being specifically heavier than the quicksilver, will sink to the bottom, with the exception of that part which is attached to the quartz or sulphuret, and is, consequently, buoyed up.

The floating skimmings are agitated by wooden cylinders of 8 inches diameter, suspended parallel to and over the centre line of the trough, and provided with radial arms of ¼ inch round iron, the ends of which are slightly curved. These arms are set along the cylinders in 12 longitudinal rows, containing alternately 8 and 9 arms, those of each row being set opposite the spaces in the next. They are not allowed to dip into the quicksilver, but almost touch it. The cylin-

ders are 2 feet 10 inches apart between the centres, and are 6 inches below each other. They make 60 revolutions per minute, and are driven by small belts. The arrangement for insuring a steady flow of blanket sands through the amalgamators is shown in the plates. * *

One amalgamator treats the blanket washings of two 5 stamp batteries. The quantity of water passing through one amalgamator is one cubic foot per minute. The tailings of the amalgamator pass through wooden riffle-sluices, generally two in number. They are 9 inches wide each, and have a grade of 1 inch to the foot. The riffles are 6 inches apart, and from $\frac{5}{8}$ inch to $\frac{3}{4}$ inch deep at the lower end. They are filled with pure quicksilver, each riffle presenting a bright surface of from 2 to 3 inches in length, by a width of 9 inches. There are generally from 20 to 30 riffles to one sluice.

The skimmings from the amalgamator and the quicksilver riffles, varying between 1-10 and $\frac{1}{2}$ of one per cent. of the crushed sands, are ground and amalgamated in slow grinding pans, combining with a minimum loss of quicksilver, a good result. A Knox pan of the form most generally adopted, is capable of grinding the skimmings of a 30 stamp mill in twenty-four hours, in three separate charges. * * *

Of skimmings 100 lbs. are charged into the pan, and water is added until the pulp will just adhere to a stick dipped in without dropping off. After three hours' grinding, the pulp is heated by steam under the false bottom. The chemicals, introduced at the same time, consist of one cupful of a mixture of equal parts of saltpetre and salammoniac. About 5 lbs. of mercury are added for every charge, simultaneously with the chemicals to the amount in the pan, which consist for the first charge of from 10 to 15 pounds. After an amalgamation of three hours, the pulp, now very fine, is diluted with water and a few handfuls of caustic lime are added, which is found to aid the coagulation of the quicksilver particles to a great extent. The diluted pulp reaching within 1 to 2 inches of the top of the pan is agitated about twenty minutes, after which it is discharged, while the muller is kept in motion, through the upper plug hole, and subsequently through the lower. A bucket placed in front of the discharge holes catches any quicksilver or amalgam which escaped during the discharge. When a clean up is required, the quicksilver and amalgam, and the small quantity of sulphides yet remaining, are washed into the bucket. Quicksilver is added and the skimmings are removed, which go back into the pan again to be reground. The amalgam is worked by hand, the lumps are broken up, the impurities floating on the surface are removed, and the quicksilver is strained through a canvas filter.

The whole of the pulp from the pan is made to run into a large tank and settled. It still retains in many cases a considerable quantity of gold, amounting to as much as $100 to the ton. The settlings are added to the coarser sulphurets, which are subsequently saved by a process presently described in these pages and treated by chlorine process.

The sands after passing the blankets, and also those from the amalgamators, discharge into the Eureka rubbers, in which the particles of gold are intended to be further cleaned and brightened by rubbing and detached from the sands, while they have an opportunity

at the same time to be caught on the amalgamated copper plates of the rubber.

The Eureka rubber consists of a rectangular cast iron box 7 inches deep and 4 feet 8 inches square, provided with a false bottom of cast iron dies or plates, on which cast iron shoes, fastened to a wooden frame receive a reciprocating motion by rods connected with an eccentric. The wooden shoe boards are covered with amalgamated copper plates. * * * * The number of revolutions of the eccentric shaft is 55 per minute. The length of stroke of the rubber frame is 4 inches. There is one Eureka rubber to every battery of 4 or 5 stamps. After passing the rubber the sands flow over amalgamated copper plates. These plates $2\frac{1}{2}$ feet wide, of soft copper and heavy material, are laid in wooden sluices which have a grade of $\frac{1}{2}$ inch to the foot. The sides of the sluices are 3 inches high. They are from 20 to 30 feet long. Three inches per stamp is the usual width of the copper plate sluices. * * * *

WORKMEN IN THE MILL, &c.

The labor of attending to the crushing and amalgamating machinery is divided in the following manner:—

One man at the rock-breaker is expected to handle 25 tons of rock in a 10 hour shift. He also removes the greater part of the waste-rock, amounting on an average to 3 per cent. of the rock delivered.

For every three 5 stamp batteries one feeder is employed, who handles in an 8 hour shift 12 tons of quartz, and also throws out all the wood and waste rock left by the hand at the rock-breaker.

The hand attending to the washing of the blankets also regulates the quantity of water passing over the blankets, watches the proper discharge of the sieves and feeds the blanket-washings to the amalgamators, while he regulates the flow of water through them. One blanket-washer attends to the blanket washings of three 5-stamp batteries.

The attendance upon the amalgamating machinery devolves upon the amalgamator who also prepares the screens, attends to the cleaning of worn-out shoes and dies, and various minor duties in the retorting and melting department. * * *

NOTES.

A mill requires 130 pounds of quicksilver per stamp. The monthly loss of mercury is $1\frac{1}{2}$ per cent., or 1 lb. for every 31 tons of rock crushed.

The monthly wear of blankets is $1\frac{1}{6}$ yards to the stamp.

A 5 stamp battery requires on an average 13 sets of screens a year. A set consists of five sheets of from 1 to $1\frac{1}{4}$ square feet.

To run a 30 stamp steam mill requires from 32 to 36 inches of water, (miner's measure,) *i. e.*, the discharge of an aperture of 32 to 36 square inches under a 6 inch pressure measured from the centre of the aperture.

A shoe lasts from 21 to 43 days, on an average 33 days, crushing 79 tons of rock. Wear $1\frac{1}{8}$ lbs of iron per ton of rock.

The die lasts on an average seven weeks, crushing 100 tons. Wear 6-10 lb. of iron per ton of rock. * * *

The expense of crushing, &c., one ton of quartz in a 30 stamp steam mill, stamps weighing 850 lbs. each, with 61 drops of 10 inches; crushing capacity, 72 tons per day, is on a full average $2.04 per ton.

The full cost of milling one ton of rock $2.04 includes steam power, labor, management, repairing, supplies, rent, interest, insurance, &c., but does not include the expense of concentrating the tailings and chlorinating the concentrates.

Steam power—Fuel and Engineers	$ 0.51
Labor—Feeding, Blanket Washing & Amalgamating	.65
Management	.12
Repairing	.02
Supplies	.17
Rents, Interest, Insurance, &c	.57
	$2.04

In a smaller mill the expense is higher. When water is the motor, a reduction of 80 per cent. can be calculated on the expense of the power; 20 per cent. of the expense remains for the heating of the water for the amalgamators. This calculation is based on the supposition that the cost of engines and boilers is the same as that of the water rights, dams, flume, and water wheel.

CLEANING UP OF THE MILL.

All the amalgamating contrivances are cleaned up every Saturday, while the battery gold is removed every few weeks on Sunday, on which day the mill is stopped and repaired. After removing the skimmings floating on the quicksilver baths of the amalgamators, the quicksilver is scooped out of the trough into a bucket and the amalgam taken up. The amalgam forms a layer in the bottom of the trough. The upper trough contains 95 per cent. of the amalgam in the apparatus. In order to clean the amalgam of impurities, principally consisting of sulphides of iron, copper and lead, precipitated with the sinking gold, it is worked by hand in a bath of quicksilver. The small lumps of amalgam are broken, and the impurities floating on the quicksilver removed with a cloth. After a thorough cleaning, the quicksilver charged with amalgam is pressed through a strong, thick piece of canvas, and the remaining amalgam formed into balls of about 2¼ inches diameter, weighing about 35 ounces each.

The quantity of mercury in the trough of one amalgamator, is about 700 pounds.

The riffles are cleaned in a similar manner. The amalgam is removed by passing a small scoop slowly close to the bottom, allowing the mercury to escape on the sides. The skimmings from the surface of the riffles are added to those of the amalgamators and treated in the pan. The amalgam on the copper plates is removed by means of a dull chisel. This operation has to be carefully performed, so as not to expose the copper. When the amalgam is removed, quicksilver

is sprinkled on the plates and spread by means of a piece of rubber belting, and the bright mercurial surface is finally washed with water.

The amalgam from the copper plates is freed from impurities by rubbing it in an iron mortar with an addition of quicksilver, while a current of water flowing in and out of the mortar removes the impurities. The washings are subsequently treated in the amalgamating pan with the skimmings.

The gold taken from the riffles is freed from accompanying iron and sand by the magnet and by panning and is added to the amalgam.

Before old shoes and dies are returned to the foundry they are overhauled for gold which is frequently found in the crevices.

The amalgam is then heated in a retort which is kept at a cherry red heat for two hours. The time taken up in retorting varies with the quantity of amalgam from four to six hours, starting with a cold furnace. When cool, the porous gold is melted in a blacklead crucible. The fluxes used are chiefly carbonate of soda, a little borax, saltpetre and sand. No matte is formed. The loss in melting is from 1 to 1½ per cent.

RESULTS OF THE MILL PROCESS.

The gold from the battery varies from 10 to 20 per cent. of the amount realized by milling. The longer the run, without a clean up of the battery, the smaller will be the proportionate result of the battery gold.

Of the whole amount realized from the sands, after leaving the battery, the mercury baths yield 65½ per cent.; the skimmings from the baths and riffles treated in pans, yield 26 per cent.; the riffles yield 2 per cent.; the rubber yields 4½ per cent.; the copper plates yield 2 per cent.

The concentrates yield from 5 to 10 per cent. of the gross yield of bullion.

CONCENTRATION OF THE MILL SANDS.

The sands after leaving the copper plates of the mill are subjected to concentration, the object of which is to collect the lost freed gold with the auriferous sulphurets to be treated by a subsequent process. The concentration consists of the following operations:—

1. Sizing the sands by means of pointed boxes.
2. Concentrating the pointed box sands in sluices with self-raising gate or riffles.
3. Subjecting the concentrated sluice sands to a further concentration in rockers, buddles, Hendy's concentrators, &c.
4. Treating the buddle concentrates by a more perfect cleaning operation in a tossing tub.

The concentrated sulphurets or arseniurets are subjected to a treatment by chlorine gas, after a thorough oxidizing or chloridizing roasting. The expense of the process, where the facilities are equal to working three tons a day, are $4.87 per ton for roasting, $2.21 per ton for chlorination proper, and for chemicals, management, &c., $4.00, in all at a full cost of $11.10 per ton.

GOLD DISTRICTS.

STORMONT.

On what is known as the Allan property at Isaac's Harbor, on area 4 B. II., a rich lead has been opened by three shafts, the extreme shafts being 100 ft. apart, and now 60 and 70 ft. deep. The lead rather thickens in depth, on an average it is 3 in., though in rolls it swells to 6 in. in thickness. The yield varies up to 9 oz. to the ton.

In the early part of the season work was continued on the Union and Consolidated areas, and the outcrops on the south side of the belt of leads were stripped.

WINE HARBOR.

The produce of this district was more than twice that of the preceding year, and the tributers in some cases obtained good returns for their labor. A party that paid 10 per cent. of the yield to the Eldorado Company for the right to work their property, were fortunate enough to find one of the many parallel veins known as the Plough lead, to yield well. It will be remembered that the company stopped work when the main vein gave out in depth, and when it was proved that it terminated against a fault on the one side, and thinned out and became impoverished on the other side as it did in depth. The quartz now mined by the tributers is from branches and spurs in the walls left on the first working. The mine now presents the appearance of an open quarry, as the original excavations were not thoroughly scaffolded and stowed, and the tributers have filled in the bottom with the debris from their operations.

At the Barrens, tributers worked on the property of Judge Henry and reopened the Moore lead on areas 15 and 27, Block D. The shaft is about 100 ft. deep on the lead which is vertical. When in mines worked by tributers I occasionally find the ladders not over secure, but worse than those in this shaft, I never met. They were vertical and *loosely* hung one from the other by bits of rope. That tributers should keep them as they were is surprising, for it is natural to suppose for the sake of their own necks, they would keep them secure. I would here repeat what should be now well known, that letting mines to tributers does not release owners from the share of responsibility imposed alike on owners, agents and managers of mines by the Mines Regulation Chapter.

In the Moore lead the slopes extend east 80 ft., in depth they are poor, and to follow the streak which dips west, a tunnel was driven west 40 ft., from which a stope was taken down.

Tributers also worked on the middle lead, in areas 4 and 5, and in the Mitchell lead, areas 9 and 10, Block F., taking out the blocks of the leads left between the workings of the old claims, and also stripping off close lying leads to depths of 20 and 30 feet.

SHERBROOKE.

The yield of this leading district though 642 ounces under that of the previous year still represents nearly half of the total produce of the Province.

In the principal mine, the Wellington, both overhand and underhand stopes have been worked to the westward of the shaft to a distance of 228 feet. One of the underhand stopes is 90 ft. to the deep of the sump. The lead maintains an average size of 18 in. though swelling up in places to 2 ft. in thickness, an unusual size for a paying lead in this Province. The overhand stopes yield from 5 to 7 dwts., and the underhand about 18 dwts. to the ton.

The closely overlying lead, the Dewar, still continues to yield a fair average and to present the alternate rich and poor horizontal streaks, which by their wonderful regularity have made this lead remarkable. The pumping shaft on the Dewar has now attained a depth of over 380 ft. The stopes from it extend to the west in two lifts, one of 100 and the other of 30 ft., and to the east to the line of the Rockville property.

On the Grapevine property, Mr. Zwickl worked the McClure lead on areas 614 and 615 B. III. and took down stopes of 170 ft. to a depth of 130 ft. But at that depth it no longer paid as it ran down from 4 ounces to 7 dwt. to the ton and is only $1\frac{1}{2}$ inches in thickness. The middle lead, 40 ft. to the south of the McClure on the same areas was worked on a stope 150 ft. long to a depth of 74 ft., and it thinned from 3 in. down to 1 inch in thickness. Mr. Zwickl then opened a lead 40 ft. still further south, which was known as the Big lead, for it is 14 in. thick. The surface quartz yielded 5 dwt., at a depth of 40 ft. $7\frac{1}{4}$ dwts. were realized, and on extending the workings the yield further improved and has since given handsome returns; so much so as to induce others to work on its extension on areas 616 and 617.

On the Alexander property Mr. McEachren and his party opened a 4 inch lead which is supposed to be the Murray and is in a line with the Dewar. The workings are next a break which going west throws the lead 4 ft. to the north. A stope of 20 ft. widened out to 60 ft. at a depth of 40 ft. shows the lead to have a number of rich strings of quartz coming in on the foot wall though the bed of slate from 8 to 15 inches thick. So rich were these strings that the "sights" collected in a powder keg yielded 7 ounces of gold.

On the south side of the anticlinal various leads have been worked in a small way on the Palmerston, Dominion, and Chicago properties. On the latter named property the Stryker lead was worked until the spring, and then the lead lying immediately north was re-opened more to the east of where it had been worked the previous year. The former workings had stopped against a fault which threw the lead 9 ft. to the north. The trouble was met by sinking a vertical shaft and taking the continuation of the lead 40 ft. down.

TANGIER.

The produce of this district was smaller than it has been for ten years. Nearly a third of it came from Mooseland where the Irving

lead was worked. On which lead a stope was taken down some 60 ft. on a length of 65 ft. west of a pinch, 25 ft. wide in the lead, that bounded the previous years' operations. Late in the year the small party of tributers who have of late years continuously worked in this district, abandoned the Irving lead for the present while they test the adjoining Cumminger lead.

On Strawberry Hill Mr. Forrest did a little mining in the Murphy lead areas 233 and 234, and some prospecting was done, on the areas to the north of the spot where the nuggets were found in 1867, by Mr. Barton, who cut a trench and tunnel along the bed rock intersecting the outcrop of several leads. But the only mining of any consequence was by Mr. Townsend, on the Forrest lead, on which an engine was erected late in the previous year to pump as well as hoist, for except during the dry seasons, the extent of the old surface workings causes much water to find its way in. The main shaft was taken down to a depth of 115 ft., and stopes opened east to a distance of 300 feet. The lead is about 3 inches thick and in working is left on the hanging wall. Most unfortunately early in August when the mine was in fair working shape, the engine house was burnt down and the machinery destroyed. It has not since been restored.

CARIBOU.

This district received more attention than it has done for many years, and the yield was larger than it has been since 1869. Messrs. Caffrey and Lawson erected by the side of the Hyde lead on area 227 an eight stamp mill, the engine of which also drives the pump in the mine. The main shaft is down 180 ft. and the stopes extend in a series of benches 340 ft. to the westward. The dip of the lead is S. 75°, and it varies from 3 to 8 inches in thickness. On area 231, on the western extension of the lead, a stope of 20 ft. was taken down to a depth of 75 ft.

Mr. Touquoy returned to this district and prospected in several parts of his property. One lead he opened 3 in. thick, which though yielding 1 oz. to the ton could not be profitably worked as the regular leads there dip as flat as 45°, which largely increases the expense of working on account of the quantity of rock to be removed to make headroom.

Much interest was taken late in the year in a new discovery 2000 feet to the north of the Hyde lead on area 629, Block II. The lead about 1 ft. thick yields 2 oz. to the ton, a very handsome return for a lead of that thickness. It has been opened by a stope 25 ft. long between two shafts, now some 40 ft. deep. On the adjoining area 630, the produce of 22 tons was only 10 dwt. The specimens from this lead are finer and more numerous than were ever before seen in this district.

MONTAGU.

Mining on the cross lead was early in the year abandoned, when the shaft attained a depth of 216 ft. The stope worked had a length of 25 ft. The lead was reported to have pinched very thin at the bottom, but as the last stoping looked somewhat better, another set of

tributers late in the year reset the pumps and prepared to reopen the mine.

Some gold was obtained by tributers from the outcrop of the Belt lead on Messrs. Lawson's property, and the extension of the lead was taken at a 25 per cent. tribute, but soon abandoned. A little prospecting was also done on several other areas, but the total yield of the district was under 150 ounces.

WAVERLEY.

Work on the Barrel lead, area 156, was continued until the autumn. The lead lying almost flat was worked long wall, the loose rock being stowed tight to the roof, behind the miners. A little work was also done on 127 and other areas on Laidlaw's Hill.

The chief operations, however, were on the Union lead, areas 169 and 170. The main shaft is now 208 ft. deep. At a depth of 110 ft. the tunnel driven 78 ft., has been extended 36 ft. more. It terminates against a strongly marked fault.

The stopes to the west stop 14 ft. short of the boundary, to prevent the water in the old workings to the west finding its way into these deeper workings. The lead is about 8 in. thick with rolls and stringers from the foot wall.

On the underlying Dominion lead, the main shaft is down 128 ft. The second shaft about 160 ft. east of it, on area 190, is now being sunk. At a depth of 28 ft. stopes were opened out to the east and west 15 ft. each. This lead varies from 12 in. to 28 in., with an average thickness of 18 inches. It carries a small quantity of gold, from 2 to 7 dwt., but the finding a small pocket of richer quartz, induced the continued and extended work.

Prospecting was conducted by Mr. Huff, area 303, by a trench 16 ft. deep, partly in the solid rock, for a distance of 110 ft. without exposing any promising leads.

On American Hill a shaft has been put down on a lead dipping N. at an angle of 60°. It starts 30 ft. north of the Graham lead, which an incline from the shaft at a depth of 60 ft. is expected shortly to cut as the Graham lead dips at the flat angle of 43°. The Graham was said to pay well when opened some years ago, but it was worked from the edge of the pond downwards into the hill in such a way that the water of the pond was let in, and further working from the surface prevented. By opening it in the manner described, a cover will be left overhead to keep out the water and the lead tested in depth.

Mr. McClure recognizes the advantages connected with keeping surface water out by leaving untouched the outcrops of leads; while, unfortunately, many holders of gold areas are so indifferent to their true interests as to allow tributers to strip the surface in all directions and so interfere with and cause constant additional expense in any future legitimate mining of their property.

GAY'S RIVER.

The excavations in the carboniferous conglomerate lying in immediate contact with the gold bearing slates in areas 4 and 26 of this [illegible] continued.

A run or deprission in the slates was followed for 500 ft. on the dip, until it abruptly ended against a face of slate. A second run, lying parallel but to the west and rise of the first, likewise ended abruptly. Operations were then resumed to the rise. In the autumn an opening was made on area 5.

On the opposite side of the brook, Mr. Corbett followed for some 80 feet the dip of the bed-rock to the east, close to the side of the old mill dam. Being without machinery, his operations are much troubled by water. The gold in the conglomerate is extracted by mortaring and panning the selected stuff; it is probable that much of the contained gold is thus lost.

CHEZZETCOOK.

In the autumn, a lead that had been worked some 10 years ago was reopened, and a sample crushed at the Lawrencetown mill gave over an ounce to the ton. The lead is from 2 to 4 inches thick, and with such an average would probably pay. At present the distance from a mill, Crooks', 13 miles off, is the nearest, is much against the interest of any operation in this locality.

LAWRENCETOWN.

Mr. Crooks worked during the winter and following autumn on the Cross lead, area 294, which runs southerly into what is known as the Crooks' lead. The mine is by the road side, near the lower bridge. Crooks' lead was the first opened in this district. On the Cross lead, which is 18 in. wide, a length of 40 ft. was stoped to a depth of 17 ft., the old pit on the Crook's lead being used as a sump. Pumping was effected by means of a light 1 in. wire rope, which conveyed power from the crushing mill 100 yards away. The mill originally belonged to the Westminster Company, and was removed to its present site by the side of the saw mill, that it also might be driven by the same water wheel. Prospecting on a small scale was done in other sections of the district. Late returns show that the Cross lead has been yielding from 1 to 3 ounces a ton.

OLDHAM.

Owing to the transfer, of what has been known as Donaldson's property, to Mr. McClure and his associates, mining on areas 130 and 131 was temporarily suspended. In the autumn it was resumed, after the machinery had been thoroughly refitted and in part renewed. The profits of the first six weeks' operations were consumed in paying for the extensive alterations and repairs. Hitherto the mine has been much troubled with water, and, after heavy rains, mining has often been forcibly suspended. To guard against inundations a thorough surface draining has been effected, yet the fault still carries a great deal of water into the mine, though not enough to overpower the present pump, even when 5½ in. of rain fell in one week. The pump now used is one of Cameron's direct acting steam pumps, but its consumption of steam, and consequently of fuel, is so great that it is regarded as anything but economical; fuel being an item of much consideration. The pump shaft has now a total depth of over 200 feet. The

working stopes extend westwardly. It is intended to sink to the east, and catch the water which now finds its way so freely into the mine by the fault, and so relieve the deep workings.

The Wallace lead, areas 337, 339 and 341, has been taken down to a depth of 50 to 60 ft. In sinking, the lead was found to thicken from 5 to 30 inches in a roll, about 14 ft. long and dipped east 20°, it was crossed by a similar roll dipping west. Below the roll the quartz gave $2\frac{1}{2}$ oz. to the ton.

The Frankfort lead, areas 321 and 322, was worked until June and then abandoned. The gold streak dipping east was followed down and the east stope next the road was sunk to a depth of 190 ft. The next going west, to a depth of 170, and the third abandoned at a depth of 140 ft. The lead was reported to have thinned to 2 in. Although the last crushings gave $1\frac{1}{2}$ to nearly 3 oz. to the ton, the lead was said not to pay.

Some further work was done on the Angling lead, area 533, which lead was described in the last report. The dump pile at the mine was washed and picked over, and yielded 10 oz. of gold.

On areas 101 to 105, the Blackie lead was stripped and stopes taken down to various depths in search for nodules of arsenical pyrites, which were found to carry gold to the extent of several ounces, and up to 5 or even 7 ounces. The gold in this lead seems to be mostly aggregated in nodules of pyrites. The old shafts on the Blackie lead, area 106, were also reopened.

The yield of the whole district was larger than it has been since 1870, and within 100 oz. of the yield of that year.

UNIACKE.

More men than of late has been usual worked as tributers in this district. The greater part ot the gold obtained was extracted by Messrs. Hogan and Barsalou from area 780, Block II.

In the cross tunnel, on the property of the Montreal Mining Association, mentioned in late reports, and which was driven 150 ft. south from the old lead; at a distance in the tunnel of 50 ft. from the old lead, the cross tunnel lead was cut. This lead did not show on the surface; it has lately been reopened by Mr. McClure and a shaft pierced to the surface and continued downwards some 60 ft. below the tunnel, giving it a total depth of 170 ft. The total thickness of this lead is 2 ft. 6 in., but only one foot of it contained an appreciable amount of gold. The solid quartz on one side of the lead being barren, while the stamping stuff on the other side is the curlly slate streaked with strings of quartz carrying gold. The operations on this lead have been abandoned as unprofitable.

While testing this lead, Mr. McClure put up new and substantial machinery on the old lead and repaired the mill, instigated by a knowledge of the previous operations and by the record of the last crushing in 1870, when 39 tons yielded 56 ounces of gold. In the original pumping shaft, 220 ft. deep, the pay streak was found dipping east, and had been passed through in the bottom. It is now intended to sink a shaft to the east, to strike if possible the streak in depth. The miners who last worked in the eastern stopes believe that the

indications were favorable to an extension of the streak. The lead varies from 4 to 10 in., with an average thickness of 8 in.

The work of repairing the old lead's most easterly surface shaft has been much hindered by the operations of tributers in late years, who by taking the outcrop left as a roof to the workings, throwing the old timbers and debris of their mining (?) down the shaft, and by letting in the surface water, have occasioned at least $1,000 additional expense.

Mr. McClure describes the practice of allowing tributers to strip the surface, as "ruinous" to the future interests of the gold miner, and justly so in the case of proved properties. Tributers are, however, a useful class of men, if only their operations are duly controlled, and when they are not, the fault lies not with them, but with the lessees of the areas, who allow them to work with their temporary interests only in view. For all the evidence on the question as to the depth to which gold may be found, points to the fallaciousness of the theory that the deposits impoverish in depth.

In this district some of the excavations in which tributers may be seen working, are in places as narrow as 14 in., with no greater width than 18 in. for a considerable distance. The narrow leads seem the more persistent and some have been traced for half a mile or more, while the thick leads are as "spews" which soon thin out. Some are in spots 20 ft. wide, and a belt of leads 25 ft. wide thins out within 50 ft. to but a string of quartz $\frac{1}{4}$ in. wide. Other leads 15 in. thick almost pinch out for a few feet, and beyond swell out again.

RENFREW.

The yield of gold from this district has been but nominal of late years. During the current year something better may be expected, for the extension of the Ophir on Mr. R. G. Fraser's property has been taken by a company and preparations made for working it. The old shaft has already been pumped out and repaired.

OTHER DISTRICTS.

At Indian Path, Ovens district, a little work was done, and 15 tons of quartz yielded $3\frac{1}{2}$ ounces of gold.

A new district was laid off at Moose River, lying to the north of Moosaland and west of Caribou, and from sights obtained in prospecting, miners are in hopes of finding a workable lead.

At Fifteen Mile Stream the returns show that only a small quantity of gold was there extracted.

IRON.

The Steel Company of Canada made a return to the effect that they mined 15,274 tons of iron ore in 1876, and employed, on an average, 72 miners and 87 mechanics, laborers and boys about their several mines at Londonderry, irrespective of those engaged about their furnaces and steel works. Mining operations are now somewhat reduced since the exploitation is so much in advance of present requirements. A sample of the yellow ochre, which is abundant in parts of the Londonderry deposits, was sent to England and readily sold. This ochre has a good dark red color when burnt, and should supply the local market.

In the spring the charcoal furnace was blown out, and as the completion of the coke blast furnaces was delayed until late in the year, little metal was made. Some 300 tons of ore were exported to England *via* St. John and most favorably reported on. Several lots of charcoal pig were also shipped from the same port at the low rate of 50 cents a ton freight.

Experiments in coking the various available coals of Pictou and Spring Hill received the attention of the Company, and they believing it to be most economical to make coke at their own works, have erected 25 coke ovens to supplement the supply furnished by the Halifax Company (Limited).

Explorations were nowhere very actively conducted during the past year. The only important discovery to be noticed was made at East Bay, Cape Breton, on Lauchlin Currie's farm, some 15 miles from Sydney. The district has been covered by a license to search taken out by Mr. Moseley. The prospecting done on the farm in question has exposed a vein of red hæmatite in a bed of crystalline limestone of Silurean age. The vein varies in the exposures seen from 5 to 9 ft. in thickness, its course is about W.S.W., and the ground is about 400 ft. above the waters of the Bay. According to the statements of the people of the district, the surface indications point to the existence of more than one vein and to a probable extension of the series for some 6 miles from French Vale to Thomson's brook, and even, perhaps, to Escasoni. No analysis of the ore has yet been made.

IRON DEPOSITS OF THE EAST RIVER, PICTOU COUNTY.

Mr. Gilpin reports that four areas, rights to work numbers 20, 21 and 22, and lease No. 33, were carefully surveyed and their corners marked by stone posts. A complete survey for a branch railway to all the chief deposits confirmed the route selected by him two years before.

Further operations were made; the vein of specular ore on the west side of the East River was traced for three quarters of a mile, and opened near the west side of area No. 22. It was there found to be 7 ft. wide and of good quality. Indications were traced of the

passage of a 5 ft. bed of red hæmatite across area No. 37 and into No. 36. Other explorations indicate the eastwardly extension of the great Blanchard bed of red hæmatite.

At Sutherland's River indications of spathic ore were found half a mile east of the openings already made.

Beds of clay-ironstone are reported to have been discovered at French River. They are said to be numerous and to vary in thickness from 6 inches to 4 ft. An assay gave 35 per cent. of iron.

IRON ORE ANALYSES.

A table of twenty-nine analyses of iron ores was published in the annual report for 1874; in the present report will be found tables of other analyses.

Numbers I. and II. are ores from areas adjoining those held by Messrs. Wright and Gisborne, at Whycocomagh, Cape Breton, and were made by Professor How of King's College, Windsor. No. II. showed traces of titanium and manganese. Nos. III., IV., V. and VI. are of samples from Messrs. Wright and Gisborne's areas. No. VI. was made by Dr. Hayes of Boston, and shows *no* phosphorus, though III., IV. and V., made by Dr. Noad of St. George's Hospital, London, show such large quantities that a negotiation for the transfer of the property was in consequence broken off.

Copies of Dr. Noad's analyses were kindly furnished by Mr. Gisborne. The analysis of the limonite from Brookfield, Colchester County, was made at the Cambria Iron Works, Penna, so Mr. Mechan, who contemplates developing the property in the spring, informs me. Another analysis of the same ore showed a still less per centage of phosphorus, .017, which is very favorable to the character of the ore.

The other analyses in the table, VII., VIII., X., XI. and XII. were made by Dr. How of King's College. The first two of magnetite found in the trap of North Mountain, Annapolis County; No. X. of the ore at Arisaig Pier, spoken of in the report for 1874; and Nos. XI. and XII. of brown iron ore, similar in appearance to that from Martins brook, Londonderry, from the Goshen hills of Hants. Another analysis of this ore was published in the report for 1874, which showed a large percentage of manganese, but which further examination proved to be abnormal. The quantity actually contained, according to Professor How's analysis, being about the same as that in the ores of the Steel Company of Canada.

Professor How also kindly examined a specimen specially selected by myself from among those of the latter, and found that the delicate encrusting fibrous mineral which attracted attention was manganite. It was from Martin's brook mines.

The analyses of the Londonderry ankerites were made by Professor Chapman of Toronto, who states that the minerals submitted to him were mixtures of Ankerite proper, with the closest related species, spathic iron ore, dolomite and calcite—the ankerite greatly predominating.

STATISTICS relating to the iron and steel importations into the Dominion were published in the report for 1875, and no later information is yet obtainable.

IRON ORES OF THE STEEL COMPANY OF CANADA

Components.	Martin's Brook Kidney Ore fibrous botyoidal Brown Hæmatite, sp. gr. 3.85.	Martin's Brook ochrious Brown Ore, sp. gr. 3.57.	Martin's Brook Specular very scaly structure, sp. gr. 4.48.	Martin's Brook earthy looking Brown Ore, sp. gr. 3.13.	Folly Mountain Brown Ore, sp. gr. 3.53.
Sexquioxide of Iron	82.52	......	98.52	83.17	77.78
Oxide of Manganese	.84	......	.16	1.04	1.17
Alumina	.38	......	.24	.42	.21
Magnesia	.14	......	.27	.15	.12
Lime	.16	......	.08	.13	.20
Phosphoric acid	.22	......	trace	.29	27
Sulphuric acid	.04	......	trace	.02	03
Silica	2.28	......	.66	4.12	6.93
Water	13.36	......	......	10.67	13.33
Total	99.94	......	99.93	99.91	100.03
Metallic Iron	57.76	58.87	68.96	58.22	54.44
Phosphorus	.096	.105	......	.126	.118
Sulphur	.016	.024	......	trace	trace.
Titanium	.000	.000	......	......	......

Components.	Furnace Quarry Ankerite, white but streaked, sp. gr. 2.99.	Furnace Quarry Ankerite, pale brown, compact, sp. gr. 3.004.	Martin's Brook Ankerite, brownish white, sp. gr. 2.995.	Folly Mountain Ankerite, white, sp. qr. 2.98.
Carbonate of Lime	52.12	48.02	49.08	50.86
Carbonate of Magnesia	23.14	26.12	25.80	24.83
Carbonate of Manganese	.96	1.08	.87	.72
Carbonate of Iron	23.71	24.67	24.23	22.90
Silica	.04	06	.04	.63
Total	99.97	99.95	100.03	99.94
Metallic Iron	11.44	11.90	11.69	11.05
Magnesia	11.02	12.44	12.28	11.82
Lime	29.18	26.90	27.29	28.48

IRON ORES. / COMPONENTS.	Whycocomagh, Cape Breton. Hæmatite (R. G. Fraser).	Whycocomagh, Cape Breton. Magnetite (R. G. Fraser).	Whycocomagh, Cape Breton. Hæmatite No. 1 (F. N. Gisborne)	Whycocomagh, Cape Breton. Hæmatite No. 2 (F. N. Gisborne)	Whycocomagh, Cape Breton. Hæmatite No. 3 (F. N. Gisborne)	Whycocomagh, Cape Breton. Hæmatite (A. Wright.)	North Mountain, Annapolis. Magnetite (Roman's).	North Mountain, Annapolis. Magnetite (Tremain).	Limonite, from Brookfield.	Red Hæmatite, Arisaig Pier.	Limonite, Goshen, No. 1.	Limonite, Goshen, No. 2.
Oxides of Iron	80.13	63.74	80.00	85.70	52.40	84.20	93.27	90.22	......	74.77	......	......
" " Manganese	......	......	.40	.20	......	......	......	......	......	trace	.55	1.11
Alumina	5.85	5.52	......	......	......	1.40	......	......	......	......	......	......
Magnesia	} 2.49	} 3.12	2.75	2.40	3.32	1.64	1.27	4.84	......	} 8.76	......	......
Lime			......	......	......	1.85	......	......	......		......	......
Phosphoric acid	trace.	trace	1.00	3.56	1.503	......	......	......	......	......	.08	.08
(Phosphorus)	......	......	......	......	......	......	......	......	.023	.37	(.035)	(.035)
Sulphuric acid	......	......	......	......	......	......	......	......	......	......	......	......
(Sulphur)	.14	.51	.00	.00	.00	.11	......	......	......	trace	......	......
Silica	10.04	24.34	14.80	6.00	42.80	10.80	5.46	4.94	none	16.10	17.82	19.59
Water	1.29	2.77	......	2.00	......	......	......	......	......	......	10.98	9.73
	99.84	100.00	99.95	99.86	100.02	100.00	100.00	100.00	......	100.00	......	......
Metallic Iron	56.00	46.16	57.20	60.00	36.67	60.90	68.33	65.03	58.95	52.34	45.69	50.79
Numbers of analyses	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.

The following extract from the Engineering and Mining Journal of New York may be of interest to prospectors of iron ores :—

"The great loss of economy in using poor ores does not seem to be generally appreciated, but it is very plainly shown in the paper by E. S. Moffatt on the "Comparative Value of Iron Ores." According to that paper, the experience of Port Oram Furnace, using New Jersey magnetites, shows that if a 60 per cent. ore is worth $5.50 per ton, to give the same cost of a ton of pig iron, a 55 per cent. ore should be worth only $4.50 ; a 50 per cent. ore, $3.53 ; a 45 per cent ore, $2.63 ; and a 40 per cent. ore, $1.81."

NOTE.—Mr. Wright states that the samples of Whycocomagh ore analyzed by Professors How and Hayes were from the eastern ravine, while Dr. Noad's analyses were from samples of a lot of 150 tons mined from the western ravine.

LEAD.

At Caledonia, Guysboro' County, just below Smith's settlement, on the west bank of the river, two narrow converging veins carrying galena were discovered during the summer of 1875. On one of these veins a tunnel was driven in 120 ft. S. E., cutting the intersection of the two veins at a distance of 85 ft.

The vein averages only 1 inch in width, though it thickens in places to 4 inches. Beyond the intersection the galena diminished in quantity. Then returning to the mouth of the tunnel, a shaft was sunk 26 ft. and a stope from it is now being taken in on the vein with a better result, though present indications are not very encouraging. The owners, Mr. McClure and Zwickl, with true mining spirit, are determined to further test the district, and will prospect in other sections this year. Some 13,100 lbs. of very pure galena were extracted and 5 tons sent to England. An analysis of the ore was given last year.

In Cape Breton, on Smith's mountain, about 2 miles from the bridge over the North river that flows into St. Ann's Bay, a quartz vein has been traced for a mile or more, showing, it is said, in the intersections of the brooks. The vein has an east and west course and averages 5 inches in thickness. Where the principal opening was made, it showed some galena spotted with copper pyrites and zinc blende. A sample of 900 lbs. sent to the Institute of Technology, Boston, yielded at the rate of 501 lbs. of concentrated ore to the ton, and at the same rate, 155 lbs. ingot lead and 2.95 ounces of silver.

COPPER.

Prospecting for copper was conducted in Antigonish County, at Polson's and Lochaber lakes and towards Guysborough, at New Annan and at Cape d'Or.

At Polson's lake, the vein previously mentioned as discovered in 1875, has been opened by a shaft 25 ft. in the vein, and its thickness there proved to be about 6 ft. The mineral matter at the point opened is chiefly spathic iron ore, yielding 35½ per cent. of metallic iron; it is spotted with copper pyrites. At a distance of 150 ft. along the vein, where the cover is reduced from 20 to 5 ft. in thickness, another opening was made, and the width of the vein there determined to be 11 ft. The percentage of copper ore is said to have also largely increased.

Mr. Ross, of Pictou, writes that other explorations disclosed three other small veins in the same locality.

But the most important discoveries were made on the most southerly of the lots on the 3rd range of the College lands, about 2 miles due west of the southern end of Lochaber lake.

Attention had been drawn two years before to the locality by the discovery of some boulders of quartz, &c., showing copper stains, and a license to search was taken out. But as the spot where the boulders were was a swamp, nothing further was done. Mr. McBean and his associates exploring at Polson's lake, visited the locality and made some examinations. Taking the line of the boulders, which was noticed to be nearly the same as the strike of the rocks, a shaft was put down on it on a knoll 100 ft. distant, and, as luck had it, directly over a vein (numbered 5 in. in the following description of the locality).

On the vein the shaft was put down some 75 ft., and the vein stuff extracted showed a great deal of solid copper pyrites associated with specular and spathic iron ores, calcite and quartz.

An analysis by Professor How of Windsor gave,—

Metallic copper	19.21
" iron	25.31
Sulphur	22.65
Lime	5.15
Oxygen, &c	4.67
Gangue	23.01
	100.00

A picked sample of fine grained ore gave 31.9 per cent. of copper.

An assay of 7 cwt. at Swansea gave 19.87 per cent. of copper.

An average of three analyses gave Mr. Gilpin 29 per cent. of copper in picked samples.

Mr. Gilpin visited the property late in the year and when further

explorations had been made, and from his report I extract the following memoranda:—

The ground is elevated about 450 ft. above the lake. The following veins have been proved in a radius of about 200 ft. and traced 100 to 300 ft.

No. 1. A three feet vein containing numerous pieces of copper pyrites crystallized and massive. Course N. 72 W.

No. 1. A. A four foot vein 6 ft. east of No. 2., which is three feet wide and holding much ore. It shows one band of ore 4 in. wide.

No. 3. Five to six feet wide with a shaft 86 ft. deep, showing 10 per cent. ore.

No. 4. Two feet wide with bands of ore up to 2 in. wide.

No. 5. A six ft. vein—already described.

No. 6. A vein three feet thick.

Veins 1. A. to 6 have a course about N. 30 W.

On the strike of No. 1, 300 yards to the east, other veins 4½ and 1½ ft. thick were exposed ; and still further on the same strike, several veins from 2 ft. downwards in thickness have been laid bare.

CAPE D'OR.

Another attempt to find copper in workable quantity in the trap rocks of Cape d'Or was made by Mr. Prendergast. A tunnel was begun at Bennett's brook on a vein carrying quartz and zeolites impregnated with copper, adjoining a dike of trap breccia. A bed of more compact trap was also opened which carries native copper as plates in the crevices and finely disseminated throughout the mass associated with small amygdaloids. The quantity of copper contained seems to be about half of one per cent. Pieces of native copper have been from time to time found on the shore near the steam whistle at the point of the Cape, in masses of several pounds weight.

NEW ANNAN.

Explorations were renewed in this locality. Drifts were opened in the sandstone beds carrying nodules and shots of copper pyrites, with a view to testing the percentage contained. About 15 tons were reported as collected, of which quantity about 4 tons were sent to England for sale, but of their value no account has yet been received.

FREESTONE.

Messrs. A. Seaman & Co. kindly furnish direct an annual statement of their shipments. That given below is for the year ended December 31st, 1876.

In the last report mention was made of the erection of a new mill at the Lower Cove quarries, and the introduction of gang saws for dressing grindstones.

Shipments from the Lower Cove by A. Seaman & Co., during 1876:

Description of goods.	Destination.	Quantity.	Value.
Grindstones............	United States	1905 tons	$26,670
Scythe whet-stones.....	"	500 gross	2,250
Grindstone frames.....	"	....	1,000
Grindstones...........	Great Britain	41 tons	820
"	Home market	88 "	1,232
Scythe whet-stones.....	"	750 gross	3,375
Grindstone frames.....	"	....	500
			$35,847

It will be noticed in the above statement that besides grindstones, frames to carry them are also made at the Lower Cove quarries. They are more especially intended for ship's use, and being made in quantity are turned out much better and cheaper than if made by a ship's carpenter.

Messrs. Seaman's manufactures received a first prize (a bronze medal) at the Centennial Exhibition, and they state that their stone is regarded at nearly 10 per cent. higher in value than American stone.

Mr. McNab, Collector of Customs at Wallace, voluntarily supplied the following complete statement of the shipments from that port:—

Description of goods.	Destination.	Quantity.	Value.
Building stone........	Boston	1106 tons	$3,871
Rubble..............	St. Peter's Canal	400 "	800
Building stone........	Halifax	211 "	844
"	P. E. Island	314 "	1178
Rubble..............	"	1571 "	780
Total..........................		3602 tons.	$7,473

Inferior sandstone is shipped from other ports to Prince Edward Island for road making, and no account is kept of it.

Antigonish reports having sent 227 tons of sand, valued at $1 a ton, to the Island.

Pictou shipped to Newfoundland 9 tons of building stone, and no knowledge is had of any further shipments.

GYPSUM.

The Collectors of Customs at the several undermentioned ports courteously supplied the following entries :—

Ports.	Tons.	Value.	Destination.
Antigonish......	1,256	$ 2,823	Quebec.
Baddeck........	2,245	2,245	United States.
"	.....	....	Quebec.
Cheverie.........	16,430	76,735	United States.
Hantsport.......	150		
Maitland.........	3,855		
Walton..........	685		
Windsor.........	55,615		
Pugwash........	75	75	P. E. Island.
Wallace........	529	444	Quebec.
"	80	56	P. E. Island.
	80,920	$82,378	

From the Great Bras d'Or, C. B., probably 5,000 tons additional were shipped to Quebec. The exports from Windsor and its outports—bracketted together,—are according to the figures kindly given by Mr. O'Brien, of Windsor.

Among the appended tables will be found one showing the quantities and values of Gypsum imported into the provinces of Canada, from the United States, from 1870 to 1875.

The statement was obtained through Mr. Goudge, M. P., Hants. In the entries for 1871 the value of crude Gypsum is evidently incorrect.

STATEMENT showing the Quantities and Values of all Gypsum and Plaster of Paris imported into Canada from the United States, during the fiscal years 1870 to 1875.

Provinces of Canada.	Crude Gypsum.		Ground not Calcined.		Ground and Calcined.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1870.	Barrels.	$	Barrels.	$	Barrels.	$	Barrels.	$
Quebec	56	89	2	6	3	13	61	108
Ontario	38,109	12,054	13,949	11,951	1,614	2,113	53,672	26,118
Nova Scotia	......	......	......	......	91	184	91	184
New Brunswick	......	......	134	210	1,549	2,529	1,683	2,739
Total	38,165	12,143	14,085	12,167	3,257	4,839	55,507	29,149
1871.								
Quebec	7	15	......	......	4	6	11	21
Ontario	31,821	35,752	1,175	1,679	1,184	1,642	34,180	39,073
Nova Scotia	......	......	46	67	173	384	219	451
New Brunswick	......	......	......	......	1,032	1,586	1,032	1,586
Total	31,828	35,767	12,21	1,746	2,393	3,618	35,442	41,131
1872.								
Quebec	......	......	......	.....	11	24	11	24
Ontario	34,572	10,716	8,711	7,974	1,057	1,480	44,340	20,170
Nova Scotia	......	......	......	......	132	220	132	220
New Brunswick	......	......	......	......	1,075	1,657	1,075	1,657
Total	34,572	10,716	8,711	7,974	2,275	3,381	45,558	22,071
1873.								
Quebec	......	......	......	......	1	3	1	3
Ontario	12,858	9,107	8,612	8,326	2,777	1,995	24,247	19,428
Nova Scotia	......	......	......	......	45	277	45	277
New Brunswick	......	......	19	37	1,887	2,994	1,906	3,031
Total	12,858	9,107	8,631	8,363	4,710	5,269	26,199	22,739
1874.								
Quebec	......	......	......	......	77	64	77	64
Ontario	37,106	20,526	1,239	1,641	4,745	5,738	43,090	27,905
Nova Scotia	......	......	......	......	181	448	181	448
New Brunswick	901	613	......	.....	2,450	3,577	3,351	4,190
Total	38,007	21,139	1,239	1,641	7,453	9,827	46,699	32,607
1875.								
Quebec	......	......	121	57	129	266	250	323
Ontario	22,786	7,219	9,859	8,250	9,773	11,131	42,418	26,600
Nova Scotia	......	......	......	......	423	553	423	553
New Brunswick	......	......	265	277	2,781	3,287	3,046	3,564
Total	22,786	7,219	10,245	8,584	13,106	15,037	46,137	30,840

BARYTES.

Much of the small quantity of Barytes mined at Five Islands is locally used in the manufacture of paints. It is sold in small lots by the country people to the Dolphin Manufacturing Company who no longer mine on their own account. And although the whole consumption of Barytes by the Company is only about 50 tons a year, they have lately had to import some Barytes to meet their requirements.

HYDRAULIC CEMENT.

Mr. R. G. Fraser, Analytical Chemist, has taken out a patent for making Hydraulic Cement from talcose minerals, calcined and ground with lime. He believes that he has found at Whycocomagh, C. B., a talcose limestone admirably adapted for this purpose, and is now conducting experiments to test the value of his discovery.

LIMESTONE.

The quantity entered in the General Summary as shipped, was sent from Pugwash to Prince Edward Island.

The Marble Mountain Quarries did nothing pending the repairs and enlargement of the St. Peter's Canal. Sample blocks of the white and various colored marbles sent from these quarries to the Centennial exhibition were much admired. The quarries were visited by Mr. Underhill, of West Rutland, Vermont, who wrote and spoke most favorably of the quality ; a matter that can only be fairly judged by a practical worker in marble.

Of the extent of the deposits and the facilities for quarrying I can justly say nothing more could be desired. An abrupt hill of solid marble several hundred feet in height rises from the shore of the Bras d'Or Lake with deep water within 100 feet. A tunnel has been driven through the broken and weathered beds on the slope of the hill into a rent which, when cleared of the clay which now fills it, presents an extended face of marble unshaken by frost. The cleavage planes of

the beds are wide apart and lie parallel to the mountain range and shore, so that large blocks can economically be extracted, removed through the tunnel and by a self-acting incline lowered to a mill, there to be cut into slabs for shipment.

While the prohibitory duty of 50 cents a cubic foot for the present closes the United States market, there should be no difficulty in competing for the local demand on the re-opening of the St. Peter's Canal, if only the quality is suitable for the trade. The value of unwrought marble imported by Nova Scotia in 1875-6 was $3,261.

ACCIDENTS.

The year 1875 was exceptionally fortunate in the matter of accidents at the collieries, not one having occasioned death underground, and only two on the surface. The past year, 1876, saw three fatal accidents at collieries, two underground from falls of coal, and one on the surface from the fall of a gin. Such a record compares favorably with those of former years, which tabulated appear as follows:—

FATAL ACCIDENTS AT COLLIERIES.

	Year 1876.	1875.	1874.	1873.	1872.
Lives lost..............	3	2	7	73	13
Tons mined per life lost..	236,548	390,582	124,674	14,403	67,765

	Year 1871.	1870.	1869.	1868.	1867.
Lives lost..............	5	4	4	7	11
Tons mined per life lost..	134,648	156,442	144,575	66,027	47,567

The marked increase in tonnage per life lost may fairly, in part at least, be credited to the improved discipline required by the Mines Regulation Chapter. A perfect immunity is, of course, an impossibility, for accidents will happen even though men should cease to be fool-hardy. In Great Britain, the highest average of tons of mineral wrought per life lost during the years 1874 and 1875 in any one district was 261,796 tons, while the average of the whole country in 1875 was but 118,730 tons. And yet mining laws *in favorem vitæ* have been there in force for over twenty years.

While discipline and divided responsibility are necessary for the effective management of large works, much divided responsibility at small mines causes the rules of the mining law to be more or less neglected. With your sanction negligence hitherto has been excused, where it appeared that it arose from inadvertence and when compliance has been promised for the future. In a general way good has resulted from it, still it is open to question whether advantage may

not be taken of it in the future, and, a warning for non-compliance expected as a custom, before an action will be taken. That the law does not sanction this view should be thoroughly well understood, lest in gross cases of violation shelter might hereafter be taken under the plea that the practice was to give a warning of the first contravention.

One of the most noticeable features of the past year's record is the small number of accidents from gas explosions, so small indeed as to raise a doubt whether all that did occur were reported. The law which managers should remember expressly requires that " where * * *any* personal injury to any person employed in or about the mine occurs by reason of an explosion of gas, powder, or any steam boiler, * * the owners, agents or managers of the mine shall within twenty-four hours next after the explosion or accident send notice in writing &c., * * to the office of the Commissioner."

Accidents from other causes are required to be reported only when the injury is serious. The degree of severity entailing a report may be differently construed, but in a case of explosion there can be no question whether it should or need not be reported.

Two accidents happened at gold mines which were not reported, as the injury done was fortunately slight, though it might have been serious. Both were occasioned by the breaking away of ladders on which three men were in each case ascending. I have occasionally had to speak of the temporary nature of the ladder fastenings since they so easily may, by little neglect become insecure. The remedy is in the hands of the miners who have but to call attention to the mining law to have their complaints examined.

The chief cause of much of the temporary character of the gear about some of the gold mines is the system of working—absent owners letting their areas for short periods to tributers, who, having no permanent interest scrimp what work they can. This subject has been before mentioned as one of the evils of the tributing system, as it is often practiced, and it might be well if owners bore in mind the share of responsibility imposed on them by the Mines Regulation Chapter for the safe condition of the mines, when they make such agreements with tributers.

FATAL ACCIDENTS.

1. February 17th—Jean Baptiste Fosse, aged 37, leaving a wife and one child. Cause—a fall of coal.
2. April 16th.—Leonard Townsend, aged 33, leaving a wife and four children. Cause—fall of a gin.
2. April 28th.—Joseph Livingstone, aged 23, unmarried. Cause —a fall of coal.

EXPLOSIONS OF GAS.

The first reported occurred at the Cumberland Colliery on driving up the return airway by the side of the main slope. If any gas at all is given off from a coal seam it is sure to collect under such circumstances. In this case the man who caused the explosion was only slightly singed.

The second took place in the Queen pit, at Sydney Mines, and injured, though not seriously, two plate-layers. It was indirectly due to the strike, for during the two months that it lasted the water rose in the deep workings and disarranged the ventilation. It seemed that a capful of gas collected behind a canvas door at the top of a deep, and the slight explosion which took place happened when the door was put aside. This occurred within a few days after work was resumed and before the air currents were all adapted to the changed conditions.

The third explosion, of which notice was given, happened in the Vale pit. The time-keeper went into the face of a rise heading to put in a measurement stamp, and although the place is said to have been reported clear a few hours before, he fired some gas and suffered burns of the face and hands.

EXPLOSION OF A STEAM-BOILER.

One was reported to have occurred at Spring Hill, August 24th, by the rupture of a flue, and to have injured a stranger standing near.

EXPLOSION OF POWDER.

But one instance of an explosion of powder occasioning injuries in a mine has to be noted. While in the act of charging a hole in the stone at the Victoria colliery, two miners were burnt, though not severely, by the premature explosion of the powder. One man lost a little finger.

Two men who ought to have known better, while prospecting near St. Anns, C. B., tried to unram a hole. They succeeded in firing the charge and burning their hands, but no more severely than their folly deserved.

FALLS OF COAL AND STONE.

Eleven causualties were reported as due to this most fuitful source of accident, two of which unfortunately proved fatal. The first happened in the Vale pit, February 21st.; J. Baptiste Fosse while endeavoring to pry down a block of coal which hung after a shot was crushed to death by the sudden giving way and fall of the block.

The second occurred in the Victoria pit, April 28th. Joseph Livingstone and his brother were working off the side coal in a cross-cut. Trusting that the coal was solid, they bored a hole for a shot, and Joseph was in the act of holing underneath, when the mass slid down and crushed him. The line of fracture was the face of one of those masses of stone often mentioned as peculiar to the Ross and Blockhouse seams.

At the Gowrie Colliery one man had his leg broken and another his back injured by falls of coal.

At Sydney Mines one man had a leg broken by a fall of stone from the roof, another by the fall of a "pot" from the roof, and a third received such serious injuries of the spine by a fall of coal, that his ultimate recovery is doubtful. The dislodgment of masses of fall

coal, which a shot has failed to bring down, causes most of these accidents, for the rupture is often sudden and without warning.

In the Caledonia pit a man had his hip dislocated from the same cause, and another at the Joggins had his thigh broken by the falling of a block off the face of a "slip."

Other slight accidents were reported to have occurred at the Glace Bay, Blockhouse and Cumberland collieries.

IN SHAFTS.

The Department was notified of two accidents, the sufferers by which may fairly be classed among the fortunate.

Kenneth McKenzie, night foreman, entered a shaft house on the Dominion lead at Waverley without a light, and, misjudging his distance, stumbled into the shaft. Luckily, he fell on the slides on the foot-wall, and involuntarily clutched them with his elbows, and so his course was directed and the impetus of his fall somewhat checked. He fell nearly 100 feet and struck the spreader at the bottom. Although his injuries were severe, he had two ribs broken and a simple fracture of one leg, his nerve was so great he pulled himself up the ladders to the surface.

In September, when helping to put in the column of pipes in the Sterling shaft at Glace Bay, P. Bryan fell from his boatswain's chair into the sump, a distance of 95 feet, and yet had the good fortune to escape with only a broken arm.

In the Wellington gold mine, Sherbrooke, a man had his arm and thigh broken by the fall of a plank from a tub going up the shaft while he was on the ladders. The General Rule of the Mines Regulation Chapter is very explicit on the matter of hoisting and travelling shafts, and does not allow a shaft to work while men are on the ladders. In this case, it appears, on enquiry, that the tub was supposed to be empty when the day shift went down. To save time they in duced the deck-man to hoist up the tub for their drills, &c., before one was at the bottom to send it away. He demurred on the ground that it was against his orders to do so, but was overpersuaded when it was represented to him that the tub was empty. However, some of the night shift attending to the pump had left the plank across the top of the tub, and the accident happened as above related. It was difficult to say who was the most to blame in the matter, and the unfornate miner himself tacitly if not actively sanctioned the infraction of the rule.

In the Cumberland pit a man, who persisted in riding on a full tub up the slope although warned not to do so, was injured, though not mortally, on the tub leaving the rails.

SURFACE ACCIDENTS.

The third fatal accident of the year was of this class. It occurred at the Spring Hill Colliery in April. Leonard Townshend, a carpenter, was helping to put up an ordinary horse gin, and was pinching the bottom of the upright into the iron socket, when it fell over. He

endeavored to get from under it, but was struck by the drum and instantly crushed to death.

The only other accident of any moment to be noted happened at Gowrie in July. The engine tender was moving the engine into position to connect the pump rods—the engine both hoists and pumps—when the fire-boy, who was bringing in a wrench, carelessly stepped on the crank and had his leg jammed against the bed plate, and his thigh broken.

All of which is respectfully submitted,

I have the honor to be,

Sir,

Your obedient servant,

HENRY S. POOLE,

Inspector of Mines.

LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	Lessee.	District.	Area Sq. Miles.
	COPPER.		
	COLCHESTER CO.		
	Patterson, Abraham	Tatamagouche	10½
	LEAD.		
	HALIFAX CO.		
1	McClure, Charles F.	Gay's River	1
	IRON.		
	PICTOU CO.		
32, 33, 34, 36, 37	Hamilton, John and others	East River	6
35	Carmichael, John R.	"	1
	CAPE BRETON CO.		
84	Protheroe, Pryse	Cow Bay	1
	INVERNESS CO.		
16	Inverness C. J. & R. Co.	Whycocomagh	1

Total area under lease..........20½ square miles,

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		ANTIGONISH CO.				
1	McKinnon, et al		3			
		CUMBERLAND CO.				
13, 14, 15	Black, C. H. M.		3			
21	Blight, James, et al.		1			
11	Bradley, Benj.		1		John Moffatt	River Hebert.
25	Campbell, Alex., et al		1			
32, 34	Campbell, Alex., et al		2			
35	Campbell, Alex.		1			
31,33,37,38,40,41	Campbell, John.		6			
12	Cumberland C. M. Co.		4			
17	Domville, James		3		E. N. Sharp	St. John, N. B
	General Mining Association.		4			
	Joggins C. M. Association	Joggins	2	working	B. B. Barnhill… *Robert Redpath*…	Joggins.
	Joggins C. M. Co.	Cumberland	2	working	A. J. Hill	Joggins.
20	Kirby, Lewis R.		1			
18, 19	Livesey, John		2			
5	Lawson C. M. Association	Maccan	1			
42	Macfarlane, Alex.		1			
1, 2, 3, 4	New York & Acadia Co.	Scotia	4	working	William Bennett	Maccan.
16	Seaman, Gilbert		1			

24	Shannon, S. L.		2			
36, 39	Shannon, S. L., (in trust) et al.		2			
43	Sharp, E. N		1			
6, 7, 8	Spring Hill Mining Co.	Spring Hill	3	working	*William Hall*	Spring Hill.
22, 23, 28, 29, 30	Styles Mining Co. [Limited]		5		J. S. Hickman	Amherst.
9	Victoria Coal Mining Co.		2			
26, 27	Wright, John V.		3			
			58			
		PICTOU CO.				
1	Acadia Coal Co.	Fraser	1		Jesse Hoyt	Stellarton.
3	" " "	Acadia	1	working		
19, 21, 22	" " "	Pictou	4			
23	Allan, Sir Hugh, Kt.	Vale	3	working	J. B. Moore *John Greener*	New Glasgow. Vale Colliery.
10	Gray, B. G.		1			
11	Haliburton, R. G., et al.		1			
	Halifax Company, (limited)	Albion	4		S. Cunard & Co. *James Hudson*	Halifax. Stellarton.
13, 14	Intercolonial Company		2			
12	" "	Drummond	1	working	Robert Simpson	Westville.
6	Kirby, Lewis R., et al.		1			
15, 30, 31	Merigomish Company		3			
25	Nova Scotia Company	Black Diamond	4	working	W. W. White	Westville.
20	Price, D. E., et al.		2			
24	Richey, M. H.		1			
			29			

LIST OF COAL LEASES.—*Continued.*

No.	Lessee.	Colliery.	Area Sq. Milas.	Working.	Agent and *Manager.*	Postal Address.
		CAPE BRETON CO.				
3	Archibald, Blowers............	Gowrie.........	1	working	Archibald & Co...	North Sydney.
2	Archibald, Thos. D............	"	1		*Chas. Archibald..*	Cow Bay, C. B.
5, 28	Blockhouse Mining Co.'y.......	Blockhouse.......	2	working	R. Belloni........	Cow Bay, C. B.
29	" " " (sea area)	....	1			
72	Brookman, Samuel............	....	1			
76, 77	" S., et al...........	....	2			
15	Caledonia C. & R. Co..........	Caledonia.......	1	working	David MacKeen....	Caledonia Mines.
31	" *(sea area)*...........	....	1			
30	Campbell, Alex..............	....	1		T. D. Archibald....	North Sydney.
23, 25, 70	Cape Breton Co. [Limited]......	....	3		Edgar Stirling.....	Sydney.
14, 24	" " "	Schooner Pond...	2		"	
49	" " "	Reserve.........	1		"	
64, 65, 68	" " "	Lorway.........	3		"	
69	" " "	Emery..........	1		"	
8, 9	Clyde Coal Mining Co..........	Ontario.........	$1\frac{1}{2}$	working	*John Sutherland..*	Port Caledonia.
66	Gardener Coal Mining Co......	Gardener........	2		William Routledge..	Bridgeport.
	General Mining Association....	Bridgeport,......	2			
	" " "	Sydney.........	5	working	*Rich'd H. Brown*	Sydney Mines.
	" " "	"	12		Cunard & Morrow	Halifax.
27	" *(sea area)*..............	"	5			
	" " "	Lingan.........	10	working	*Donald Lynk*.....	Lingan,
	" " "	"	4			
38	*(sea area)*..............	....	5			

39	*(sea area)*...............	....	5		E. P. Archbold..	Halifax.
4, 12, 16	Glace Bay Mining Co..........	Glace Bay.......	3	working	*Henry Mitchell*..	Little Glace Bay.
75	Henry, W. A..................	....	1			
22	Ingraham, R. J. & J. L.........	Halfway.........	1			
6, 13, 18, 19	International C. & R. Co........	International....	4	working	*Patrick Neville*.....	Bridgeport.
71	Jennings, Edward............	....	1			
47	LeCras & McInnes...........	....	1			
10, 21	Matheson, J..................	....	2			
74	Moore & Moseley.............	....	$1\frac{1}{4}$			
81	Morton, Lemuel J............	....	1			
80	McDonald, James............	....	1			
52, 53	McLeod, Hugh...............	....	2			
83	Protheroe, Pryse.............	....	1			
73, 82	Reid, Thos. S, *(sea areas)*......	....	2			
40, 41, 42	Ross, H. E., et al..............	....	3	......	....	Point Aconi.
79	Ross, Walter J., et al *(sea area)*..	....	1			
43	South Head Coal Co..........	South Head......	1	working	*James Baird*.......	Cow Bay.
32	Sword, Wm. *(sea area)*.........	....	3			
54 to 63	Sydney C. M. Co. *(sea areas)*....	....	10		S. N. Robinson..	North Sydney.
46	Todd, A. Thornton............	Collins..........	1	working	*George Scott*....	Little Bras d'Or.
67	Weatherbe & Kirby...........	....	1			
78	Weatherbe, Robt. L. *(sea area)*..	....	5			
34, 35. 36	Victoria C. M. Co. *(sea area)*.....	Victoria.........	5	working	Joseph Salter......	Low Point.
50, 51	" " "	....	2			
			$125\frac{3}{4}$			
		INVERNESS Co.				
5	Aylmer, John Evans Freke.....	Cape Mabou.....	2			
8	Evans, Thomas...............	Chimney Corner..	1			

LIST OF COAL LEASES.—*Continued.*

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
9	Evans, Thomas *(sea area)*......	....	1			
13	Murray, George...............	Port Hood......	3	working	John P. Lawson...	Port Hood.
12	McCully, Jona., et al..........	....	1			
4	Richey, M. H., et al............	....	1			
11	Ross, W. J......................	Broad Cove......	1			
6	Ross, H. E., et al *(sea area)*.....	....	1			
7	Ross, H. E., et al..............	....	1			
14, 15	Smyth, Peter.................	....	2			
10	Tremain, E. D., *(sea area)*......	....	1			
			15			
		RICHMOND CO.				
2	Marmaud, A. E................	Little River.....	1			
		VICTORIA CO.				
2	Campbell, Charles J...........	New Campbellton	3	working	John Macdonald...	New Campbellton
3, 4, 5,	Ross, Hon. William............	Black Rock......	5			
			8			

Total area under lease............239¾ square miles.

COAL TRADE BY COUNTIES.

TABLE A'

1876.	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		1875.
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Sold.
1st Quarter......	12,472	9,938	78,233	18,521	39,913	4,066	450	82	131,068	32,607	31,788
2nd Quarter.....	23,198	19,373	78,101	75,537	79,789	65,384	1,763	1,494	182,851	161,788	161,421
3rd Quarter.....	30,847	28,891	72,174	104,984	113,209	124,187	3,086	2,188	219,316	260,250	328,154
4th Quarter......	26,715	26,326	77,882	76,576	71,191	75,171	623	1,489	176,411	179,562	185,432
Total	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,646	634,207	706,795
1875.	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795	706,795
1874	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127	749,127
1873	27,592	26,345	383,949	333,984	639,085	520,189	841	588	1,051,467	881,106	881,106
1872	15,750	14,153	422,716	388,417	437,326	380,274	5,158	3,070	880,950	785,914	785,914

COAL TRADE BY COUNTIES.
TABLE B.

Markets.	Cumberland.		Pictou.		Cape Breton.		Other Count's.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.....	3,168	2,821	37,413	25,679	6,831	3,175	1,192	132	48,604	31,807	80,411
Sea-borne......	928	....	50,333	5,716	80,762	4,255	3,253	....	135,276	9,971	145,247
Nova Scotia—Total .	4,096	2,821	87,746	31,395	87,593	7,430	4,445	132	183,880	41,778	225,658
Quebec......	....	....	84,878	248	31,667	370	140	....	116,685	618	117,303
New Brunswick....	63,039	13,330	4,667	1,180	18,999	503	172	....	86,877	15,013	101,890
Newfoundland	....	....	1,589	279	49,553	185	136	....	51,278	464	51,742
P. E. Island.........	....	....	17,048	22,999	6,075	558	228	....	23,351	23,557	46,908
United States......	1,242	....	17,600	1,987	38,044	12,761	....	....	56,886	14,748	71,634
West Indies........	....	....	4.002	....	13,969	....	....	....	17,971	....	17,971
Europe............	....	....	....	....	1,101	....	....	....	1,101	....	1,101
Total.........	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207

COAL SALES.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1876.	1875.
Nova Scotia—						
Land Sales.	19,139	15,540	15,140	30,592	80,411	57,718
Seaborne...	2,951	33,372	60,388	48,536	145,247	154,912
Total..	22,090	48,912	75,528	79,128	225,658	212,630
Quebec........	......	43,867	57,887	15,549	117,303	189.754
New Brunswick	8,826	21,466	41,105	30,493	101,890	85,968
Newfoundland...	558	8,438	24,702	18,044	51,742	62,348
P. E. Island....	......	11,000	23,369	12,539	46,908	43,641
United States..	......	24,974	34,836	11,824	71,634	89,746
East Indies....	......	......	......	......	......	1,003
West Indies....	1,133	2,582	2,823	11,433	17,971	16.429
South America.	......	......	......	......	......	4,779
Europe........	......	549	......	552	1,101	......
Total......	32,607	161,788	260,250	179,562	634,207	706,795

COAL.—GENERAL STATEMENT.

1876.	Produce.	Sales.	Colliery Consumption.
1st Quarter..............Tons.	131,068	32,607	32,284
2nd " .... "	182,851	161,788	26,444
3rd " .... "	219,316	260,250	25,395
4th " .... "	176,411	179,562	29,665
Total.............1876	709,646	634,207	113,788
Total.............1875	781,165	706,795	124,110
Total.............1874	872,720	749.127	119,582
Total.............1873	1,051,467	881,106	108,398
Total.............1872	880,950	785,914	101,341

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31st, 1876.

Collieries.	Seams.	Produce.	Sales. Bearing Royalty.	Sales. Free.	Sales. Total.	Sales. Per Centage.	Colliery Consumption. Engines.	Colliery Consumption. Workmen.	Colliery Consumption. Per Centage.
CUMBERLAND COUNTY.									
Cumberland	Cumberland	5,055	3,096	....	3,096	61	725	32	14
Scotia	North	1,285	1,121	89	1,210	94	388	....	30
South Joggins	Joggins	14,296	11,765	726	12,491	87	800	132	6
Spring Hill	Black	72,596	52,395	15,336	67,731	92	2,463	1,113	4
COLCHESTER COUNTY.									
Folly Mountain	....	12	10	2	12	100	....	....	....
PICTOU COUNTY.									
Acadia	Acadia	60,280	45,319	11,082	56,401	93	3,677	1,498	8
Albion Mines	Deep Main	44,612 91,661	90,550	29,977	120,527	88	17,533	4,098	15
Intercolonial	Acadia	53,872	40,622	6,292	46,914	87	2,076	5,016	13
Nova Scotia	Acadia	21,375	12,674	5,134	17,808	83	4,046	748	22
Vale	McBean	34,590	28,365	5,603	33,968	98	1,452	958	6
CAPE BRETON COUNTY.									
Block-house	Block house	34,819	31,033	2,187	33,220	95	3,200	1,448	13
Caledonia	Phelan	30,789	25,323	6,242	31,565	102	917	325	4
Collins	Collins	7,693	5,693	619	6,312	82	1,043	608	21
Emery	Emery	....	40	615	655	....	1,905	389	....
Gardiner	Lorway	....	....	....	....	....	3,120	730	....
Glace Bay	Harbor	30,022	28,598	364	28,962	96	2,333	1,162	11
Gowrie	McAuley	29,275	20,103	6,157	26,260	89	1,714	2,640	14
Ingraham	Indian	40	40	....	40	100	....	8	....
International	Harbor	24,111	25,524	180	25,704	106	1,330	1,846	13
Lingan	Lingan	15,289	14,236	2,297	16,533	108	2,948	898	25
Ontario	Phelan	11,095	10,833	455	11,288	101	105	243	3
Reserve	Phelan	....	14	862	876	....	636	549	....
Schooner Pond	Emery	....	2,123	596	2,719	....	141	11	....
South Head	Spencer	653	760	156	916	....	16	84	15
Sydney Mines	Main	102,644	70,137	499	70,636	68	24,422	6,305	29
Victoria	Ross	17,672	12,544	578	13,122	70	2,756	1,885	26
INVERNESS COUNTY.									
Port Hood	....	2,548	2,120	130	2,250	88	506	149	25
VICTORIA COUNTY.									
New Campbellton	....	3,362	2,991	....	2,991	88	488	203	20
		709,646	538,029	96,178	634,207	89	80,740	33,048	16

Statement of the number and classes of persons employed, and average results at each Colliery, during the year ended Dec'r 31st, 1876.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of days per person.		Average No. of tons per Cutter.	Average tons per day per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers	Boys.	Days Labor.	Mechanics.	Laborers	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Days Labor.	Underground.	Surface.				Above.	Below.	Days.
Cumberland	11	2	1	2,494	6	7	2	2,193	12	2,398	41	7,085	178	146	459	1.7	19	1	......	261
Scotia	6	2	1	1,054	1	2	1	1,013	......	......	13	2,067	117	253	214	1.9	11	1	......	112
South Joggins	30	2	10	9,654	11	8	3	5,206	......	......	64	14,860	230	236	476	2.5	76	4	4	186
Spring Hill	90	35	21	38,807	19	39	7	16,739	3	652	214	56,198	266	257	806	3.1	280	3	6	259
Acadia	83	25	18	27,318	21	42	3	18,306	......	......	192	45,624	216	277	726	3.4	284	15	5	212
Albion Mines	268	50	77	80,058	47	132	41	58,011	......	......	615	138,069	202	263	508	2.7	{ Ds 264 / Ms 445 }	24	28	{ Ds 169 / Ms 206 }
Intercolonial	71	33	20	21,338	33	43	11	24,024	3	524	214	45,886	172	276	758	3.3	237	7	3	227
Nova Scotia	33	9	8	13,194	8	13	14	6,993	......	......	85	20,187	264	199	647	3.4	114	4	3	186
Vale	77	17	11	22,741	30	32	3	10,191	......	......	170	32,932	216	156	449	4.4	342	2	7	101
Block-house	54	6	21	13,171	19	27	2	11,308	......	......	129	24,479	162	235	644	4.9	269	6	16	129
Caledonia	44	6	10	12,662	11	15	2	5,807	......	......	88	18,469	211	207	699	4.7	208	8	7	148
Collins	34	6	7	8,386	10	13	5	5,378	8	2,083	83	15,847	178	192	226	1.1	38	2	2	198
Emery	1	......	1	626	4	7	1	1,507	......	......	14	2,133	......	126	......	......	......	6	......	......
Gardiner	......	......	......	......	5	......	......	1,110	......	......	5	1,110	......	222	......	......	......	2	......	......
Gowrie	61	6	22	10,995	10	44	11	10,161	12	92	166	21,248	123	156	479	4.0	247	6	15	118
Glace Bay	51	3	17	14,265	14	8	4	6,244	30	3,916	127	24,425	201	240	588	2.4	124	5	14	241
International	48	11	9	12,509	21	13	7	8,749	......	......	109	21,258	184	213	502	5.3	256	8	11	94
Lingan	46	5	12	8,464	......	24	10	8,813	6	338	103	17,615	134	260	332	2.7	125	8	8	122
Ontario	34	3	2	5,412	4	30	2	4,269	......	......	75	9,681	139	119	326	1.7	58	3	2	190
Reserve	2	......	......	663	4	2	2	1,562	......	......	10	2,225	......	195	......	......	......	13	......	......
Schooner Pond	......	......	......	......	1	17	2	901	......	......	20	901	......	45	......	......	......	3	......	......
South Head	3	......	1	226	2	......	1	152	4	61	11	439	56	51	217	3.8	11	1	......	56
Sydney Mines	165	42	77	67,955	50	76	28	42,431	78	21,948	516	132,334	239	275	622	2.8	473	19	49	217
Victoria	37	20	6	10,818	9	13	5	6,394	......	......	90	17,212	172	237	477	2.9	108	1	2	163
Port Hood	8	3	2	2,266	2	2	2	981	8	819	27	4,066	174	163	318	2.3	18	1	......	137
New Campbellton	22	5	3	3,155	4	9	5	3,633	......	......	48	6,788	105	201	153	.8	17	4	......	189
	1,279	291	357	388,231	346	618	174	262,076	164	32,831	3,229	683,138	202	230	555	3.2	181	147	182	170

COLLIERY CONSTRUCTION ACCOUNT.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Colliery Buildings.	Dwellings.	Surface Work.	Railways.	Wharves.	Prospecting	Total.
CUMBERLAND CO.											
Cumberland....	$...........	$1,789.00	$2,950.00	$ 2,158.00	$ 395.00	$ 590 00	$ 695.00	$ 155.00	$ 720.00	$	$ 9,452.00
Spring Hill.... ...	....	....	....	283.11	383.00	....	1,055.00	....	.. ..	28.05	1,749.16
PICTOU CO.											
Acadia..........	....	....	....	....	208.66	748.74	468.84	143.12	....	....	1,569.36
Albion Mines.. ...	....	....	....	4,068.43	102.45	1,085.30	924.24	....	....	....	6,180.42
Intercolonial... ...	....	....	....	140.86	154.76	....	....	2,019.38	....	....	2,315,00
Nova Scotia	....	....	....	....	68.00	....	....	508.00	....	764.00	1,340.00
CAPE BRETON CO.											
Collins.........	....	1,176.71	1,803.31	10,745.09	1,351.61	....	271.04	1,137.25	681.34	....	17,166.35
Glace Bay...	7,206.24	....	....	....	....	....	....	....	....	....	7,206.24
Gowrie..............	....	350.00	448.00	....	....	....	1,150.00	126.00	....	....	2,074.00
International... ...	....	28.41	....	....	....	....	....	....	....	....	28.41
Lingan......	....	....	1,883.00	188.00	186.00	....	....	....	....	....	2,257.00
Ontario......	....	.. ..	566.14	....	....	80.00	....	....	....	....	646.14
Sydney Mines.....	8,987.08	....	....	3.30	....	209.78	101.54	1,445.34	3,324.98	....	14,072.02
INVERNESS CO.											
Port Hood...... ...	....	2,250.00	660.00	.. ..	478.00	....	86.00	....	....	....	3,474.00
VICTORIA CO.											
New Campbellton.	....	....	1,016.00	1,020.00	....	....	50.00	....	72.00	....	2,158.00
	$16,193.32	$5,594.12	$9,326,45	$18,606.79	$3,327.48	$2,713.82	$4,801,66	$5,534.09	$4,798.32	$ 792 05	$71,688.10

INTERCOLONIAL RAILWAY.

Statement of Coal received at the several stations, from Mines in Nova Scotia, &c., for year ended, December, 1876.

STATIONS.	Quantity Tons.	STATIONS.	Quantity Tons.
*Halifax	10,167	*Dorchester	19,362
Bedford	88	Memramcook	185
Windsor Junction	5,710	Painsec	6
Enfield	316	Shediac	376
Elmsdale	70	Point DuChene	62
Milford	46	Moncton	1,654
Shubenacadie	358	Salisbury	144
Stewiacke	60	Petitcodiac	317
Brookfield	64	Anagance	12
Truro	4,614	Penobsquis	34
Riversdale	6	Sussex	524
West River	16	Apohagin	42
Hopewell	214	Norton	30
New Glasgow	2,084	Bloomfield	6
*Pictou Landing	71,957	Passe Keag	54
DeBert	48	Hampton	204
Londonderry	9,952	Nauwigewauk	6
Wentworth	6	Rothesay	108
Greenville	10	Saint John	9,013
Thompson	12	Chatham	127
Oxford	236	Miramichi	265
River Philip	15	Bathurst	30
Athol	58	Campbellton	44
Maccan	6	Flag Stations	761
Amherst	1,640		
Aulac	112	Total Tons	142,019
Sackville	788		

* Shipping Ports.

MISCELLANEOUS NOTES

PORT OF HALIFAX.

1876.	Imports.	Exports.
Coal, Anthracite	7,313 tons, $28,698	
" Bituminous	" "	69 tons, $362.

NOTE.—See report for 1875 for shipments of previous years.

AMERICAN GAS COAL.—Cannelton coal imported into the Lower Provinces for gas making, 3000 tons; and Cannelton gas caking coal, 2500 tons.

COKE

made at

Albion Mines,	Spring Hill,	Sydney,	Londonderry,
6,912 tons.	31 tons.	49 tons.	?

DOMINION OF CANADA.

IMPORTED COAL AND COKE.

From	1874-5.		1875-76.	
Great Britain	139,600 tons,	$ 551,317	168,642 tons,	$ 494,958
United States	512,835 "	2,524,771	625,203 "	2,824,975
Newfoundland	110 "	330	....	....
Spanish W. Indies	....	....	10 "	40
St. Pierre, &c.	....	....	25 "	87
	652,545 tons,	$3,076,418	793,880 tons,	$3,320,060

THE PROVINCES OF THE DOMINION IMPORTED 1875-6.

COAL AND COKE.

	Great Britain.	United States.	S. W. Indies.	St. Pierre
Nova Scotia	1,715	5,096	10	25
New Brunswick	7,782	24,059		
P. E. Island	.....	314		
Quebec	159,055	122,673		
Ontario	5	472,716		
Manitoba	.....	282		
British Columbia	85	63		

COAL SALES in Nova Scotia from 1785 to 1876 (Inclusive.)

Year.	Sales.	Total.	Year.	Sales.	Total.
1785	1,668		1831	37,170	
1786	2,000		1832	50,396	
1787–1790	10,681		1833	64,743	
			1834	50,813	
			1835	56,434	
			1836	107,593	
			1837	118,942	
			1838	106,730	
			1839	145,962	
		14,349	1840	101,198	839,981
1791	2,670		1841	148,298	
1792	2,143		1842	129,708	
1793	1,926		1843	105,161	
1794	4,405		1844	108,482	
1795	5,320		1845	150,674	
1796	5,249		1846	147,506	
1797	6,039		1847	201,650	
1798	5,948		1848	187,643	
1799	8,947		1849	174,592	
1800	8,401	51,048	1850	180,084	1,533,798
1801	5,775		1851	153,499	
1802	7,769		1852	189,076	
1803	6,601		1853	217,426	
1804	5,976		1854	234,312	
1805	10.130		1855	238,215	
1806	4,938		1856	253,492	
1807	5,119		1857	294,198	
1808	6.616		1858	226,725	
1809	8,919		1859	270,293	
1810	8,609	70,452	1860	322,593	2,399,829
1811	8,516		1861	326,429	
1812	9.570		1862	395,637	
1813	9.744		1863	429,351	
1814	9,866		1864	576,935	
1815	9,336		1865	635,586	
1816	8,619		1866	558,520	
1817	9,284		1867	471,185	
1818	7,920		1868	453,624	
1819	8,692		1869	511,795	
1820	9,980	91,527	1870	568,277	4,927,339
1821	11,388		1871	596,418	
1822	7,512		1872	785,914	
1823–1825	27,000		1873	881,106	
1826	12.600		1874	749,127	
1827	12,149		1875	706,795	
1828	20,967		1876	634,207	4,353,567
1829	21,935				
1830	27,269	140,820		Total......	14,422,710

SUMMARY.

1775 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4.927,339
1821 " 1830	140,820	1871 " 1876	4,353,567

NOTE.—If 13 per cent. be allowed for colliery consumption, the total output has been 16,297,562 tons.

REPORT of the Chief of the Bureau of Statistics, 1876.

(Extract.)

Coal Trade with British America.

United States.	Exported.	Imported.
1865	$ 815,794	$ 13,977
1866	660,151	243,891
1867	889,672	855,639
1868	916,310	782,687
1869	954,026	758,588
1870	1,048,347	613,106
1871	1,100,732	640,459
1872	1,455,591	608,623
1873	2,175,758	683 292
1874	3,062,679	1,077,464
1875	2,034,527	607,673

NOTE.—The quantities entered as imported by the United States in 1865, and 6 are evidently underestimated, when the known quantities exported by Nova Scotia are compared. In 1866 the duty of $1.25 was imposed, and the stated values of the coal imported in the following and subsequent years are much more reliable.—H. S. P.

Nova Scotia exported to the United States.

COAL.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1864	347,594	Free.
1851	116,274	"	1865	465,194	"
1852	87,542	"	1866	404,252	$1.25
1853	120,764	"	1867	338,492	"
1854	139,125	Free.	1868	228,132	"
1855	103,222	"	1869	257,485	"
1856	126,152	"	1870	168,180	"
1857	123,335	"	1871	165,431	"
1858	186,743	"	1872	154,092	.75
1859	122,720	"	1873	264,760	"
1860	149,289	"	1874	138,335	"
1861	204,457	"	1875	89,746	"
1862	192,612	"	1876	71,634	"
1863	282,774	"			

NOTE.—The quantities given for the Years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably underestimated. At least, the figures given by the Board of Trade for the year 1873, the only year available for comparison with the comprehensive tables now published by this Department, are 12 per cent. below those given in the above table.—H. S. P.

VENTILATION BY FURNACE.

COLLIERY.	Furnace Dimensions, in feet.				Length of heated Column.	Courses.			Temperature. (Fahr.) degrees			Cubic feet of air per minute.	Coal used per day.
	Length of bars.	Width.	Height above bars.	Height below bars.		Number.	Greatest Length in feet.	Least Sectional area in ft.	Downcast.	Upcast.	Return.		Tons.
Joggins	5	6	4	2	145	2	2900	13′	38	108	48	27,300	$1\frac{3}{4}$
Spring Hill	6	6	$4\frac{1}{2}$	$2\frac{1}{4}$	24	1	3000	36	76	94	66	1,200	
Acadia	6	11	6	$2\frac{3}{4}$	100	2	7000	84	75	134	64	27,200	$1\frac{3}{4}$
Albion Cage Pit	6	7	7	$2\frac{1}{2}$	120	3	10,000	50	38	60	54	33,000	$1\frac{3}{4}$
Intercolonial No. 4	$4\frac{1}{2}$	6	$3\frac{1}{2}$	2	88	1	3300	75′	......	......	......	19,000	8 cwt.
Nova Scotia	6	10	9	3	200	4	7200	40″	40	130	55	52,000	$1\frac{1}{4}$
Vale	$5\frac{1}{3}$	$7\frac{1}{2}$	5	2	140	2	3000	36	......	......	......	25,000	
Blockhouse	6	$6\frac{1}{4}$	5	$1\frac{3}{4}$	122	2	5000	50	23	58	......	30,000	
Caledonia	6	7	$4\frac{1}{3}$	$2\frac{1}{2}$	140	2	8000	40	64	68	50	14,000	
Emery	......	......	......	......	......	1	4300	36	62	68	66	21,500	
Glace Bay (Harbor)	4	4	$1\frac{1}{2}$	$1\frac{1}{4}$	40	1	7500	30	76	......	53	7,000	
Gardener	......	......	......	......	......	1	3000	32	10	95	50	18,000	
Gowrie	7	$4\frac{1}{2}$	6	$2\frac{1}{2}$	204	2	9700	36	36	71	......	10,400	
International	9	$6\frac{1}{2}$	5	$3\frac{1}{4}$	100	1	6700	45	38	......	52	15,000	
Lingan	7	7	4	$1\frac{3}{4}$	48	2	9000	33	38		61	22,400	
Reserve	9	$5\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	108	7	4600	16	62	100	72	26,200	
Sydney	6	$5\frac{3}{4}$	4	$2\frac{1}{2}$	380	2	16,500	36	38	122	57	37,500	4 tons.
Victoria	4	$4\frac{1}{2}$	3	3	80	2	11,000	9	39	51	49	6,000	
New Campbellton	6	3	1	2	17	2	2500	9	......	......	......	7,900	

VENTILATION BY FAN.

COLLIERY.	Fan Dimensions.			Engine.		Courses.			Cubic feet of air per minute.
	Diameter in inches.	Width in feet.	Revolutions per minute.	Diameter of Cylinder in inches.	Length of Stroke in inches.	Number.	Longest in ft.	Least Sectional Area in ft.	
Albion Foord Pit	30	10	40	24	24	2	15,000	49	65,000
Intercolonial	20	6′ 8″	32	16	24	2	4,000	52	58,000

COLLIERY WINDING ENGINES AT SHAFTS.

COLLIERIES.	Nominal Horse Power.	No. of Cylinders.	Diar. of Cylinder in inches.	Length of Stroke in inches.	How Geared, (Direct or Ratio.)	Diar. of Drum.	Size of Rope.	Depth of Shaft.	Coal draw each trip in cwt.	No. of Boilers.	Length in ft.	Diar. in inches.	Working Pressure in lbs.
			in.	in.		ft.	in.	ft.	cwt.		ft.	in.	lbs.
Albion, Foord Pit	315	2	38	60	D	18	$6\frac{1}{2}$	980	45	5	35	66	40
" Cage Pit	75	1	27	60	D	5	$3\frac{3}{4} \times \frac{3}{4}$	274	11	1	35	66	40
Blockhouse	23	1	15	48	3 F	5	$4\frac{1}{2}$	80	12	3	40	30	60
Caledonia	21	2	11	24	4	6	$4\frac{1}{2} \times \frac{5}{8}$	205	25	5	30	30	60
Gardener	81	2	20	48	D	8	4	160	20	4	27	39	45
Glace Bay, Sterling Pit	26	2	12	33	D	6	......	224	......	4	35	36	40
Gowrie	85	2	20	42	D	8	......	260	......	4	30	36	40
"	25	1	16	42	2	8	$3\frac{1}{2} \times \frac{5}{8}$	220	9	2	27	60	35
International	50	2	16	42	$1\frac{1}{2}$	$6\frac{1}{2}$	3	87	13	2	24	42	45
Sydney, Queen's Pit	134	1	33	72	D	$10\frac{1}{2}$	$4\frac{1}{4}$	360	23	5	30	60	26
" Lloyd's Cove Pit	283	2	36	60	D	18	6	681	46 ?	4	35	66	40

COLLIERY WINDING ENGINES AT SLOPES.

Collieries.	Nominal Horse Power.	No. of Cylinders.	Diar. of Cylinders.	Length of Stroke.	How Geared.	Dia. of Drum.	Size of Rope.	Length of Slope.	Dip. of Seam.	Coal drawn each trip in cwt.	No. of Boilers.	Length.	Diameter.	Working Pressure.
			in.	in		ft.	in.	ft.		cwt.		ft.	in.	lbs.
Cumberland	21	2	11	30	3	8	2½	730	19°	33	3	25	33	50
Joggins	11	1	11	30	3	8	3½	750	19°	33	2	25	33	50
Spring Hill	54	2	18	27	4	9	3¾	830	36°	50	4	30	60	50
Acadia	44	2	15	42	4	9	3⅜	1460	23°	60	12	30	32	40
Intercolonial No. 1	47	2	16	36	2 F	8	3½	1250	16°	60	3	30	60	35
No. 4	17	1	14	30	2	5	3½	1500	14°	60	1	18	48	40
Nova Scotia	45	2	16	30	4	10	4	1600	29°	50	9	30	30	60
Vale	21	2	12	18	4	6	3	840	33°	50	7	29	36	55
Collins	24	2	12	24	2	6	2	1000	5°	40	3	30	36	50
Emery	48	1	22	44	2½ F	5	3	1205	4°	100	5	30	36	50
Lingan	143	2	26	42	D	21	3	2250	16°	300	2	25	72	28
Reserve	48	1	22	44	2½ F	5	2½	2204	4°	150	5	30	36	50
Schooner Pond	13	1	12	30	3½	3½	2½	653	9°	60	1	15	60	50
Victoria	104	2	22	54	D	10	4	864	41°	60	7	30	36	60
Port Hood	12	1	12	24	5	5	2	660	23°	40	2	30	30	60
New Campbellton	5	1	8	14	2	4	2	400	12°	20	1	8	4	35
Block House	24	1	15	44	F	5	2	1950	4°	80	3	40	36	60

COLLIERY PUMPING ENGINES.

COLLIERY.	Steam Engine.			Kind of Pump, Bucket, Plunger, or Steam.	Working Barrel.		Strokes per minute.	Lifts.		Nominal H. P. of Engine.
	Diameter of Cylinder.	Length of stroke.	Geared.		Diameter.	Stroke.		Number of	Height in ft.	
	in.	in.			in.	in.				
Joggins	14	22	D	S	7	22	25	1	100	15
Spring Hill	22	30	D	S	9	30	25	1	437	42
Acadia	16½	42	2	P	8	72	4	2	280,–340	26
Albion, Foord Pit	62	108	D	B P	18	108	6	3	each 320	565
" Cage Pit	16	42	2½	B	8	48	6	2	each 150	25
Intercolonial No. 1 & 2	14	15	D	S	7	15	40	1	320	13
Nova Scotia	20	30	D	S	6	30	15	1	560	35
Nova Scotia L L	14	15	D	S	6	15	20	1	230	13
Vale	18	24	D	S	6	24	30	1	429	26
Block House	16	12	D	S	7	12	60	1	90	17
Caledonia	12	30	5	B	9	48	10	2	140,–60	13
Collins	14	12	D	S	7	12	60	1	110	12
Emery	12	24	D	S	7	24	30	2	each 80	12
Gardener	14	24	D	S	7	24	50	1	160	16
Glace Bay (Sterling)	16	30	D	S	8	30	50	1	210	19
Gowrie	16	42	2½	B	10	48	10	2	each 100	25
International	16	24	D	S	6	24	30	1	80	21
Lingan	16	24	D	S	6	24	30	1	176	21
Reserve	16	24	D	S	9	24	30	1	49	21
Sydney Queen Pit	70½	76	D	B	20	72	6½	2	363	200
" Lloyds' Cove Pit	62	108	D	B	20	108	8	2	334,–345	565
Victoria	18	30	D	S	7	30	25	2	470,–165	28
Port Hood	18	24	D	S	6	24	60	1	260	26
New Campbellton	14	20	D	S	9	20	50	1	45 ?	15

GOLD.

General Statement for the year 1876.

Shewing the number of Mines at work, days labour performed, quantities of Quartz crushed, yield of Gold, &c., &c., for the twelve months ended December 31st.

Districts.	Number of Mines.	Days Labour.	Mills Employed.	Steam Power.	Water Power.	Total No. of Stamps working one day.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at $18.00 per oz.
								oz.	dwt.	gr.	oz.	dwt.	gr.	oz.	dwt.	gr.	
Caribou........	3	6,000	2	2	....	......	542	1	6	11	2	....	8	717	4	10	$2.15
Gays River.....	2	2,504	1	1	....	......	1,699	....	2	21	....	3	3	246	10	4	1.76
Montagu........	2	1,405	1	1	....	......	81	1	16	19	19	....	....	149	1	17	1.90
Oldham..	12	15,757	2	....	2	3,900	1,705	1	2	21	6	10	20	1,953	5	23	2.23
Renfrew.......	3	1,307	1	....	1	540	164	....	9	5	10	19	....	75	14	10	1.03
Sherbrooke.....	10	37,269	4	2	2	6,324	6,205	....	16	16	6	4	....	5,176	15	15	2.49
Stormont.......	2	3,607	1	....	1	......	370	....	14	10	5	16	....	267	....	5	1.36
Tangier.......	3	8,274	3	2	1	......	716	....	10	16	1	6	19	382	13	....	0.83
Uniacke.	2	4,752	1	1	....	......	321	....	14	4	5	12	....	227	14	10	0.86
Waverley.......	4	2,107	2	1	1	......	1,661	....	18	12	2	12	....	1,539	7	....	1.31
Wine Harbour..	3	7,848	1	1	....	2,244	1,929	....	12	15	4	19	....	1,217	19	7	2.79
Other Districts..	2	1,474	4	2	2	......	97	....	17	14	2	2	14	85	7	13	1.03
	48	111,304	23	13	10	......	15,490	....	15	13	19	....	....	12,038	13	18	$1.94

1876.
MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

Month.	Caribou.							Renfrew.							Monatgu						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.
January	..	......	....	....	....	....	...	2	215	8	......	....	....	..	3	179	7	17	30	5	....
February	..	......	....	....	....	....	...	3	307	12	140	17	....	..	3	285	11	3	22	9	....
March	..	......	....	....	....	....	...	3	241	9	200	12	8	..	2	238	9	13	42	1	17
April	..	......	....	....	....	....	...	2	242	9	150	13	9	8	3	307	12	12	*28	6	....
May	1	670	26	....	....	....	...	3	346	13	180	29	19	17	1	16	1	..	....	....	....
June	1	795	30	....	....	....	...	3	337	13	180	28	2	..	1	135	5	20	15	4	....
July	2	666	26	100	119	12	9	2	196	8	180	28	4	20	1	20	1	..	....	....	....
August	3	735	28	58	72	19	...	2	172	7	185	20	2	2	1	40	2	..	....	....	....
September	3	661	25	113	120	5	1	2	168	6	170	23	11	..	1	20	1	5	2	10	....
October	3	769	29	69	124	6	23	2	218	8	180	22	....	..	2	91	4	8	5	10	....
November	4	892	34	67	76	5	16	1	25	1	50	24	....	..	1	35	1	..	....	....	....
December	4	812	31	135	203	15	9	1	37	1	84	27	13	5	2	39	2	3	2	16	....
	3	6,000	....	542	717	4	10	2	2,504	....	1,699	246	10	4	2	1,405	..	81	149	1	17

* 2 oz. 18 dwt. from sand.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

Month.	Waverley.							Wine Harbor.							Other Districts.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.
January	4	1,781	69	109	99	1	..	3	803	31	188	69	....	1	2	86	3	11	13	2	17
February	4	1,691	65	106	109	12	..	2	692	27	149	94	....	..	2	201	8	....	....	..	..
March	5	1,959	75	207	197	19	..	2	660	25	251	129	....	..	2	167	6	10	8	..	13
April	5	1,670	64	253	193	13	..	3	559	22	142	57	8	20	1	75	3	3	1	9	5
May	4	1,972	76	91	151	15	..	3	537	21	220	118	3	5	1	49	2	....	....	..	..
June	4	1,762	68	134	97	1	..	3	652	25	215	152	1	22	1	34	1	6	....	12	19
July	3	1,581	61	143	139	..	..	3	593	23	148	115	15	12	2	167	6	35	18	1	12
August	3	1,645	63	99	97	10	..	4	700	27	96	94	5	6	1	85	3	2	1	11	21
September	6	2,154	83	131	105	19	..	4	567	22	130	141	11	18	2	206	8	....	....	..	..
October	4	1,644	63	145	127	2	..	3	556	21	110	88	1	..	2	135	5	7	11	13	1
November	5	1,643	63	120	141	16	..	5	845	32	203	112	11	3	3	88	3	8	7	11	12
December	5	1,605	62	123	78	19		4	684	26	77	46	....	16	3	181	7	15	23	4	9
	4	21,107	....	1,661	1,539	7		3	7,848	....	1,929	1217	19	7	2	1,474	....	97	85	7	13

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(*Continued.*)

Month.	Oldham.							Renfrew.							Sherbrooke.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.
January......	8	1,600	61	56	197	5	18	3	100	4	8	2	16	4	10	2,816	108	533	480	14	22
February.....	8	1,000	40	96	171	13	2	4	150	6	13	6	5	..	10	2,800	108	439	427	11	16
March........	10	1,422	55	86	217	10	11	5	203	8	33	14	15	21	10	2,800	108	358	352	16	1
April.........	12	1,364	52	76	48	6	4	3	179	7	35	13	3	23	8	2,756	106	484	342	4	2
May.........	12	1,315	51	282	178	15	10	2	86	3	28	11	6	13	9	2,652	102	472	413	1	...
June........	14	979	38	124	146	15	12	3	96	4	......	....	....	..	10	2,808	108	532	322	7	12
July........	10	1,238	48	196	154	18	4	2	65	3	......	....	....	..	12	3,016	116	282	252	14	6
August......	14	992	38	102	53	14	2	4	85	3	......	....	....	..	10	3,321	128	585	466	16	4
September.....	12	1,428	55	47	70	18	9	3	88	3	14	5	10	..	12	3,510	135	428	346	10	12
October.......	15	1,479	57	256	285	8	8	3	85	3	10	9	15	10	9	3,536	136	868	645	4	...
November.....	13	1,548	60	212	248	13	9	3	95	4	5	5	10	8	10	3,614	139	700	587	6	12
December....	13	1,392	53	172	179	7	6	3	75	3	18	6	11	3	10	3,640	140	524	539	9	...
	12	15,757	....	1,705	1,953	5	23	3	1,307	....	164	75	14	10	10	37,269	..	6,205	5,176	15	15

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

Month.	Stormont.							Tangier.							Uniacke.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwts.	Grs.
January	3	240	9	....	....	..	..	3	1,089	42	7	3	....	..	3	330	13	17	13	15	20
February	3	280	11	....	....	..	..	3	1,585	61	......	....	....	..	2	178	6	40	9	1	...
March	3	242	9	....	....	..	..	3	1,081	41	232	*92	11	..	2	194	7	27	12	9	...
April	3	220	8	5	8	1	7	3	982	38	115	44	2	..	2	241	9	13	12	2	...
May	3	240	9	....	....	..	..	3	722	28	109	57	18	..	2	442	17	55	19	6	...
June	3	290	11	322	40	19	..	2	573	22	41	48	17	12	2	529	20	31	30	7	...
July	2	174	7	....	....	..	..	4	783	30	48	23	8	12	1	427	16	25	25	10	...
August	2	132	5	....	....	..	..	3	752	29	20	22	18	..	2	380	15	11	20	1	...
September	3	790	30	....	....	..	..	3	523	20	89	†69	6	..	2	274	10	45	20	12	...
October	1	322	12	23	143	9	22	1	223	9	25	9	2	..	3	626	24	21	31	4	14
November	1	315	12	....	....	..	..	1	203	8	30	11	10	..	2	507	19	11	20	10	...
December	1	362	14	20	74	10	..	1	208	8	......	....	....	..	2	624	24	25	12	16	...
	2	3,607	....	370	267	0	5	3	8,724	....	716	382	13	..	2	4,752	..	321	227	14	10

* 3 oz. 16 dwts. from plates. † 15.12.

GOLD.

GENERAL ANNUAL SUMMARY.

YEAR.	Total ounces of Gold extracted.			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A day.	A year
1862	7,275			6,473	1	2	11	156,000	$0.83	$249
1863	14,001	14	17	17,002		16	11	273,624	.92	276
1864	20,022	18	13	21,434		18	16	252,720	1.42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2.15	645
1866	25,204	13	2	32,161		15	2	211,796	2.14	642
1867	27,314	11	11	31,386		17	9	218,894	2.24	672
1868	20,541	6	10	32,262		12	17	241,462	1.53	459
1869	17,868	0	19	35,147		10	4	210,938	1.52	456
1870	19,866	5	5	30,829		12	21	173,680	2.05	615
1871	19,227	7	4	30,791		12	11	162,994	2.12	636
1872	13,094	17	6	17,093		15	7	112,476	2.09	627
1873	11,852	7	19	17,708		13	9	93,470	2.28	684
1874	9,140	13	9	13,844		13	5	77,246	2.12	636
1875	11,208	14	19	14,810		15	4	91,698	2.20	660
1876	12,038	13	18	15,490		15	13	111,304	1.94	582
	254,111	8	16	340,853				2,601,268		

DISTRICT SUMMARIES.

CARIBOU.

YEAR.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2000 lbs.			Total days labor.	Average yield per man per day in dwts. at $0.90	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	$1.62
1870	613	11	2	755		16	6	6,500	1.88	1.69
1871	504	15	23	479	1	1	1	2.964	3.40	3.06
1872	209	15	0	368		11	9	2,184	1.92	1.72
1873	17	16	12	21		16	23	312	1.14	1.02
1874	368	10	23	333	1	2	3	4,651	1.58	1.42
1875	446	12	19	368	1	4	6	3,675	2.43	2.18
1876	717	4	10	542	1	6	11	6,000	2.39	2.15

MONTAGU.

1863	366	14	16	140	2	16	2	38,688	.18	$0.16
1864	1,052	19	14	545	1	18	15	11,492	1.83	1.64
1865	902	12	23	615	1	9	8	12,376	1.45	1.30
1866	496	15	10	382	1	6	0	6,032	1.64	1.47
1867	436	15	16	244	1	15	11	7,826	1.11	.99
1868	584	14	22	350	1	13	10	7,384	1.58	1.42
1869	805	13	14	572	1	8	3	8,944	1.80	1.62
1870	3,831	9	5	916	4	3	14	15,106	5.06	4.55
1871	3,152	8	15	848	3	14	8	15,938	3.95	3.55
1872	1,793	10	6	683	2	12	17	13,832	2.59	2.33
1873	1,440	3	9	679	2	2	9	10,972	3.62	2.35
1874	655	0	22	496	1	6	10	5,452	2.40	2.16
1875	287	18	17	72	3	19	23	2,526	2.27	2.05
1876	149	1	17	81	1	16	19	1,405	2.83	2.38

OLDHAM.

YEAR.	Total ounces of Gold extracted.			Quartz crushed.	Yield per ton of 2000 lbs.			Total days labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	oz.	dwt.	gr.		dwt.	
1862	51	0	0	84		12	3	4,368	.23	$0.24
1863	1,223	3	21	1,026	1	4	6	25,896	.94	.84
1864	1,750	5	12	2,238		15	11	37,934	.94	.84
1865	1,126	11	20	2,236		10	1	18,278	1.23	1.10
1866	956	12	20	966		19	19	11,362	1.68	1.51
1867	1,100	3	14	870	1	5	7	15,418	1.42	1.27
1868	719	0	4	1,012		14	4	8,008	1.79	1.61
1869	1,394	16	0	1,735		16	1	17,576	1.58	1.42
1870	2,051	15	3	2,644		15	12	20,254	2.02	1.81
1871	1,718	12	12	1,374	1	4	4	13,494	2.54	2.28
1872	1,014	11	10	793	1	5	14	8,580	2.36	2.12
1873	998	2	17	662	1	10	3	6,994	2.85	2.46
1874	665	8	11	527	1	5	6	3,420	3.86	3.27
1875	915	8	3	550	1	13	6	6,100	3.00	2.70
1876	1,953	5	23	1,705	1	2	21	15,757	2.47	2.22

RENFREW.

1862	308	8	0	171	1	15	10	10,920	.56	$0.50
1863	785	7	7	575	1	7	7	21,216	.74	.66
1864	1,172	6	5	1,229		19	1	12,220	1.91	1.71
1865	1,008	10	18	927	1	1	18	14,430	1.39	1.25
1866	6,423	15	11	6,003	1	1	9	38,142	3.36	3.02
1867	7,904	19	2	7,222	1	2	4	61,308	2.57	2.31
1868	3,373	14	9	5,994		11	6	39,598	1.70	1.53
1869	3,097	15	7	7,258		8	12	34,606	1.79	1.61
1870	1,171	18	11	3,243		7	2	11,310	2.07	1.86
1871	1,179	17	16	2,463		9	4	10,972	2.15	1.93
1872	323	3	8	855		7	13	5,668	1.14	1.02
1873	59	16	18	255		4	16	2,028	.59	.53
1874	3	3	7	10		6	7	190	.33	.29
1875	47	16	6	113		8	11	690	1.38	1.24
1876	75	14	10	164		9	5	1,307	1.15	1.03

SHERBROOKE.

1862	2,023	0	0	663	3	1	0	22,464	1.80	$1.62
1863	3,304	14	12	3,454		19	8	31,200	2.11	1.89
1864	3,419	14	20	2,673	1	6	8	32,630	2.09	1.88
1865	3,424	1	21	2,511	1	7	6	23,010	2.97	2.67
1866	5,829	13	8	2,853	2	0	20	22,490	5.18	4.66
1867	9,463	18	0	7,378	1	5	15	35,958	5.31	4.78
1868	7,070	0	5	9,880		14	7	59,540	2.37	2.13
1869	5,546	11	16	11,500		9	15	41,964	2.64	2.37
1870	7,134	4	0	11,428		12	11	48,880	2.91	2.61
1871	6,579	19	7	13,882		9	9	50,856	2.58	2.32
1872	4,188	9	21	5,243		15	17	38,246	2.21	1.98
1873	5,026	0	4	7,187		15	9	31,460	3.19	2.87
1874	4,037	1	2	5,430		14	20	31,199	2.58	2.32
1875	5,818	15	10	6,443		18	1	38,683	3.00	2.70
1876	5,176	15	15	6,205		16	16	37,269	2.77	2.49

STORMONT.

YEAR.	Total ounces of Gold extracted.	Stuff crushed.	Yield per ton of 2000 lbs.	Total days labor.	Average yield per man per day in dwts., at $0.90.	
	Oz. Dwt. Gr.	Tons.	oz. dwt. gr.		Dwt.	
1862	397 0 0	197	2 0 7	12,792	62	$0.55
1863	1,587 13 12	526	3 0 7	15,600	2.03	1 82
1864	1,510 4 21	636	2 7 11	25,844	1.16	1.04
1865	1,696 6 2	1,040	1 12 14	25,350	1.29	1.16
1866	1,254 17 9	2,253	11 2	11,208	2.23	2.00
1867	1,266 16 15	782	1 11 3	12,428	2.03	1.82
1868	673 2 17	596	1 2 14	14,560	.92	.82
1869	227 0 13	590	7 16	6,110	.74	.66
1870	578 5 15	1,525	7 13	6,552	1.76	1.58
1871	559 7 21	1,937	5 18	5,590	2.00	1.80
1872	472 0 11	543	17 9	4,316	2.18	1.96
1873	37 18 5	181	4 4	832	.91	.81
1874	167 19 20	236	14 5	1,799	1.86	1.67
1875	267 6 18	620	8 14	2,543	2.10	1.89
1876	267 0 5	370	14 10	3,607	1.48	1.33

TANGIER.

1862	865 0 0	707	1 4 11	39 000	.44	.39
1863	494 8 21	655	15 2	37,440	.26	.23
1864	607 7 8	698	18 10	16,380	.74	.66
1865	644 7 13	639	1 0 4	13,156	.97	.87
1866	296 5 21	791	7 11	9,074	.65	.58
1867	691 14 7	724	19 2	6,864	2.01	1.80
1868	921 8 9	725	1 4 7	11,700	1.57	1.35
1869	1,192 3 10	1,332	17 21	15,938	1.49	1.34
1870	1,814 2 10	2,732	13 6	29,328	1.23	1.11
1871	2,093 0 7	2,924	14 7	27,326	1.53	1.38
1872	829 8 15	1,622	10 5	10,426	1.59	1.43
1873	726 11 15	1,070	13 4	8,892	1.63	1.46
1874	419 7 5	706	11 21	5,092	1.64	1.47
1875	448 2 15	1,106	8 1	6,667	1.34	1.21
1876	382 13 0	716	10 6	8,274	.92	.82

UNIACKE.

1866	72 16 9	28	2 12 0	1,326	1.09	$0.98
1867	1,622 13 20	1,968	16 12	14,274	2 27	2.04
1868	3,247 3 17	3,874	16 16	27,898	2.32	2.08
1869	1,867 3 12	3,172	11 18	22,022	1.69	1.52
1870	566 14 5	1,794	6 7	6,214	1.82	1.63
1871	360 17 3	900	8 0	4,342	1.66	1.49
1872	241 10 0	364	13 7	1,950	2.47	2.22
1873	129 8 18	198	13 1	1,222	2.52	2.26
1874	14 1 0	19	14 19	60	4.68	3.81
1875	139 3 3	319	8 17	2,643	1.05	.94
1876	227 14 10	321	14 4	4,752	.96	.86

WAVERLEY.

YEAR.	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days labor.	Average yield per man per day in dwts., at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	oz.	dwt.	gr.		Dwt.	
1862	1,507	0	0	3,741		8	1	46,800	.66	$0.59
1863	2.380	6	3	6,755		7	1	58,344	·81	.72
1864	6,410	4	22	9.238		13	23	88,244	1.44	1.29
1865	14,404	4	9	12,518	1	3	0	87,308	3.29	2.96
1866	8,612	17	11	16,750		10	6	98,800	1.74	1.56
1867	3,942	5	2	10,510		7	12	46,436	1·69	1.52
1868	2,387	8	22	6,372		7	11	36,972	1.26	1.13
1869	1,591	14	10	3,915		8	3	16,796	1.89	1.70
1870	811	3	21	2,619		6	4	13,546	1.19	1.07
1871	1,427	18	12	2,772		10	6	17,472	1.62	1.45
1872	1,047	17	0	1,761		11	21	12,766	1.64	1.47
1873	1,009	0	0	2,013		10	0	13,520	1.49	1.34
1874	1,553	12	15	1,682		18	11	12,541	2.47	2.22
1875	1,740	1	0	1,313	1	6	12	18,807	1.85	1.66
1876	1,539	7	0	1,661		18	12	21,107	1.45	1.30

WINE HARBOUR.

1862	1,688	0	0	835	2	0	10	12.792	2.63	$2.36
1863	3,718	2	19	3,644	1	0	10	36,688	2.02	1.81
1864	4.033	3	7	4,136		19	12	22,984	3 50	3.15
1865	2,200	5	14	3,833		11	11	16,588	2.65	2.38
1866	1,012	8	4	1,881		10	18	8.814	2.29	2.06
1867	845	18	14	1,670		10	3	13,390	1.26	1.13
1868	1,248	6	3	2,938		8	12	23,166	1.00	.90
1869	719	8	19	2,726		5	6	20,462	.70	.63
1870	914	15	14	2,356		7	17	8,034	2.27	2.04
1871	1,538	6	16	2,927		10	4	11,232	2.74	2 46
1872	2.572	10	18	2,305	1	2	7	8,840	5.82	5.23
1873	2,000	0	3	2,267		17	15	12.688	3.15	2.83
1874	623	11	6	1,193		10	14	5,605	2.26	2.03
1875	492	11	22	1,140		8	15	3,942	2.49	2.24
1876	1,217	19	7	1,929		12	15	7,848	3.10	2.79

OTHER DISTRICTS.

1862	436	0	0	75	5	19	10	6,864	1.26	$1.13
1863	141	3	2	225		12	13	6.552	.43	.38
1864	66	12	0	38	1	15	0	4,992	.27	.24
1865	47	3	8	102		9	6	2,470	.38	.34
1866	248	10	19	250		19	23	4,550	1.09	.98
1867	39	6	17	16	2	9	3	4,992	.15	.13
1868	316	6	22	518		12	15	12.636	.50	.45
1869	424	12	15	761		11	3	15,444	.54	.48
1870	378	5	15	812		9	7	7,956	.95	.85
1871	112	2	16	281		8	0	2,808	.79	.71
1872	402	0	13	2.552		3	3	5,668	1.41	1.26
1873	407	9	13	3,175		2	13	4,550	1.79	1.61
1874	622	16	18	3,212		3	21	7,327	1.70	1.53
1875	354	0	1	676		10	11	3,441	2.05	1.82
1876	85	7	13	97		17	14	1,474	1.15	1.03

FINANCIAL STATEMENT.—GOLD.

Mines Department, for 12 months, ended December 31st, 1876.

	RECEIPTS.			EXPENDITURE.			
DISTRICTS.	Rents.	Royalty.	Totals.	Return of Rents.	Royalty Commission.	Salaries and Surveys.	Totals.
Caribou	$ 84 00	172 68	256 68	....	6 55	....	6 55
Fifteen Mile Stream	....	69 86	69 86	....	....	....	....
Gay's River	4 00	84 64	88 64	....	4 97	....	4 97
Lawrencetown	....	16 77	16 77	....	40	....	40
Montagu	64 00	62 25	126 25	....	3 72	....	3 72
Oldham	44 00	682 22	726 22	....	22 17	220 52	242 69
Ovens	10 00	1 42	11 42	....	07	....	07
Renfrew	210 00	20 12	230 12	68 00	43	75 00	143 43
Sherbrooke	26 00	1826 60	1852 60	....	85 57	748 00	833 57
Stormont	16 00	29 65	45 66	23 36	91	297 70	321 97
Tangier	6 00	52 83	58 83	....	....	....	....
Uniacke	20 00	78 68	98 68	....	3 93	....	3 93
Unproclaimed	44 00	....	44 00	....	....	54 50	54 50
Waverley	12 00	569 46	581 46	....	30 95	....	30 95
Wine Harbor	70 00	419 44	489 44	3 95	21 11	471 00	496 06
Prospecting Licences	....	....	361 75	....	....	....	Re. 13 25
	$ 610 00	4,086 63	5,058 38	$ 95 31	180 78	1,866 72	$ 2,156 06

OTHER THAN GOLD.

Mines Department for 12 months, ended December 31st, 1876.

COUNTIES.	RECEIPTS.				EXPENDITURE.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Surveys.	Totals.
Annapolis	$ 20 00	50 00	....	$ 70 00	....	....	....
Antigonish	640 00	....	....	640 00	20 00	....	20 00
Cape Breton	580 00	375 00	19,547 88	20,502 88	60 00	....	60 00
Colchester	280 00	....	1 10	281 10	....	....	....
Cumberland	540 00	275 00	7,315 59	8,130 59	....	81 50	81 50
Guysboro'	440 00	50 00	....	490 00	....	....	....
Inverness	140 00	75 00	....	215 00	20 00	....	20 00
Lunenburg	20 00	....	....	20 00	....	....	....
Pictou	540 00	325 00	23,542 41	24,407 41	....	....	....
Richmond	....	50 00	....	50 00	....	....	....
Victoria	80 00	50 00	....	130 00	....	....	....
	$3,280 00	1,250 00	50,406 98	$54,936 98	$ 100 00	81 50	$ 181 50

ABSTRACT ACCOUNT.

RECEIPTS and EXPENDITURE for the Twelve Months, ended December 31st, 1876.

RECEIPTS.

Licenses to Search	Coal.........$	3,280 00	
" " Work	"	1,250 00	
Royalty	"	5,0406 98	
			$54,936 98
Rents,	Gold.........	610 00	
Royalty,	"	4,086 63	
Prospecting Licenses	"	361 75	
			5,058 38
		$59,995 36	$59,995 36

EXPENDITURE.

Return Licenses to Search	Coal......$	100 00	
Surveys.................	"	81 50	
			$ 181 50
Return Rents,	Gold........	95 31	
" Prospecting Licenses	"	13 25	
Royalty Commission	"	180 78	
Salaries and Surveys	"	1,866 72	
General Expences....................		5,423 80	
Postage..........................		68 00	
Stationery and Printing............		744 18	6,235 98
		$8,573 54	$8,573 54

REPORT

OF THE

Department of Mines,

NOVA SCOTIA

FOR THE YEAR 1877.

HALIFAX, N. S.:
PRINTED BY THE NOVA SCOTIA PRINTING COMPANY,
1878.

CONTENTS.

DEPARTMENT OF MINES.

REPORT

FOR THE YEAR 1877.

To His Honor the Honorable Adams George Archibald, *C. M. G., Lieut.-Governor of Nova Scotia, &c., &c., &c.*

May it Please Your Honor :—

The undersigned herewith begs to present to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1877.

ALBERT GAYTON,
Commissioner of Public Works and Mines.

Halifax, February 11th, 1878.

REPORT

ON THE

Inspection of Mines in Nova Scotia,

For the Year ended 31st December, 1877.

BY HENRY S. POOLE, F.G.S., ASSOCIATE OF THE ROYAL SCHOOL OF MINES, &c.

HALIFAX, February, 1878.

SIR,—I beg to submit the following Annual Report on the Mining Industry of the Province for the past year. It embraces besides matters connected with inspection, comments on subjects of interest to the Government as mineral owners as well as to the industry in general, and also statistics of operations conducted outside of Crown reservations.

A tabular view of the mineral output of the past year appears as follows:—

SUMMARY, 1877.

Minerals.	Quantities	Greatest Previous Production.	
		Quantities.	Years.
Metallic.			
Gold........................ounces.	16,882	27,314	1867
Iron Ore.......................tons.	18,603	15,274	1876
Manganese Ore................ "	97	300	1865
Copper " .... "	285	45	1876
Lead " .... "	11	6	1876
Non-metallic.			
Coal......................... "	757,496	1,051,467	1873
Gypsum....................... "	107,506	120,693	1873
Freestone, &c................ "	9,343	8,829	1874
Limestone.................... "	6,726	4,860	1875
Barytes...................... "	23	1,103	1869–70
Moulding Sand................ "	160	300	1874

Comparing this summary with that of the preceding year, its general appearance is not unfavorable.

GOLD MINING.—The districts of Sherbrooke, Oldham and Caribou having yielded exceptionably well, the total produce of the year shows an increase of 40 per cent.

IRON MINING.—The Iron Works at Londonderry being in successful operation, called for an additional output of 3000 tons of ore, and doubtless, during the current year, will requiie a further increase.

MANGANESE MINING.—Though this branch of the mining industry is conducted on a small scale only at Teny Cape, it is satisfactory to notice its revival.

COPPER MINING.—A most promising deposit of ore has been cut at Polson's Lake, and had it not been for liligation, the quantity mined would have been larger, and the extent of the deposit better known.

LEAD MINING—has not yet passed beyond the prospecting stage, at Caledonia and Pembrooke.

COAL MINING.—Though the output for the year is slightly in advance, the business is still as depressed, in consequence of the restricted demand.

OTHER NON-METALLIC MINERALS.—As no returns are received direct from the quarries, except in the case of freestone, the entries in the Summary are compiled from data courteously supplied by Collectors of Customs, and are comparable with those of previous years. The shipments of gypsum are probably correct, those of freestone and limestone also; but as quarries of the two latter supply the home demand which is unknown, the produce credited to them must be regarded as incomplete.

CHANGES AND IMPROVEMENTS IM MINING PRACTICE INTRODUCED OF LATE YEARS.—A review of the mining practices of to-day and those of a few years ago is not without interest. Among the advances made of late years in the country, and the appliances found serviceable and economical abroad which have been adopted, may be found the following :—

Discipline has been improved in the mines consequent on the requirements of the Mines Regulation Chapter, which was added to the Statutes of the Province in 1873.

Exploring for minerals has been facilitated by the use of the Diamond Drill. In former Reports the depths and cost of some bore holes in Pictou and Cumberland Counties were given ; and the success met with in proving measures and in tapping water for artesian wells was stated. A further record of efficiency in this drill will be found mentioned in this Report under the heading Pictou County. Boring with a rope and free-fall cutter was successfully practised at Gowrie Colliery and at Lake Ainslie to a depth of 1600 feet. Electric signalling has been introduced at the Joggins, and the electric battery for sinking the Sterling pits at Glace Bay.

High Explosives, dynamite, lithofracteur and rendrock have proved invaluable in sinking in hard and wet ground, and especially with the aid of a battery. The general use of dynamite is believed to have been chiefly instrumental in reviving the gold mining industry.

Fans have replaced furnaces for controlling the ventilation of the Foord and Drummond pits. Warming the intake has been practised in winter to prevent the formation of ice on the guides in the Foord pit and on the rails of the Vale slope.

Pumping.—Direct-acting steam pumps have been very generally adopted for unwatering dip workings, and they were used in sinking the Gardener pits. The adoption of these pumps in pits where the standage is small and the water quick is a change of doubtful value. But further economy has been effected and a great objection to their use removed by turning the exhaust steam into the suction. One of these pumps at the Nova Scotia Colliery now forces to a vertical height of 765 feet through 1600 feet of pipe.

Boilers have been fitted at Sydney and Gardener with water indicators besides the ordinary glass gauge-cocks; at Emery with a scum collector, described elsewhere in this Report as very efficacious for preventing scaling and pitting of the plates; and at Acadia with furnaces contrived to utilize the refuse duff or dross of the coal by aid of the steam jet, whereby an estimated saving of some $3,000 a year is effected. One of Jukes' self-feeding furnaces is in use at Sydney. Nearly all colliery boilers are now shedded over for protection from the weather, and for the comfort and health of the stokers.

Forewinning the Coal, or adapting Bord and Pillar Workings to the entire removal of the pillars within a few years.—This system might be more generally and advantageously practised than it is. It is most systematically conducted at the Joggins and Spring Hill in Cumberland, in the workings of the Acadia and McBain seams of Pictou, and at Gowrie in Cape Breton. The great extent of lost and wasted pillarage in some pits suggests that temporary expediency and easy indifference has indefinitely postponed the introduction of a system that at first and until workmen are skilled and accustomed may give some additional trouble and anxiety.

In the Handling of Coal, to prevent breakage at the bank-head, tubs with doors are in common use, and to affect the same object and yet keep to the ordinary square boxes, which have many advantages over tubs with doors, a tipping cradle, described when directly referring to Sydney Mines, has been there adopted. Fowler's clip-pulley on self-acting inclines at Caledonia and Gowrie. Tipping platforms for flat-bottomed wagons fitted with doors at the new pier at North Sydney and at the Sydney pier of the Cape Breton Company; telescopic shoots at Caledonia and Sydney; while ordinary shoots are now generally preferred to the primitive and destructive 'drop.' Incline roads at the staiths to facilitate the handling of empty and full wagons. Revolving screens are in use at Spring Hill and the Joggins for cleaning and otherwise treating slack coal.

Closely allied to the preparation of slack is the question of the consumption of this waste product both in colliery and domestic uses. The former has already been mentioned, the latter has been extended by the introduction of Soft Coal Base Burners, the latest form of which

is the home-made Argalia, manufactured by the Windsor Foundry Company. This stove is much on the same principle as the Dubuque described two years ago. It is meeting with general favor in the country, and although only introduced late last year, some 25 have been disposed of. The company expect to make between 200 and 300 of these stoves this year, as they are capable of utilizing ordinary slack coal. That of Spring Hill, for instance, selling at Windsor for $1.60 per ton.

At Sydney Mines it is proposed to introduce during the current year several late inventions. To apply to one of the high pressure engines for trial a Davy's Separate Condenser, which is claimed at small cost to save 12 pounds of steam. To have the cages at the New Winning attached to the ropes by Fowler's Safety Hooks, an appliance which Mr. Bell, one of H. M. Inspectors of Mines, speaks of in terms of unqualified praise. In England it is now seriously proposed to make the use of Safety Hooks compulsory, to prevent accidents from overwinding. To weigh the coal, from the cutters, on the bank-head by a Billy Fair Play, an arrangement by which discrimination is made between good and poor colliers, the skilled workman being paid proportionately to his skill by having two prices for round and slack, both being weighed *after* separation. A new kind of pick has already been introduced which is liked by the cutters. It is Hardy's Universal. Its merits are portability and truth, one handle of hickory serving for a number of picks, as all are so uniformly made that they are interchangeable. The picks are made of cast steel of special quality and do not blunt as readily as the common pick. Extra care has, however, to be taken in the sharpening not to heat the points above a cherry red.

Other improvements may be looked forward to being introduced, as the use of coal-cutting and wedging machines; self acting steam-brakes; balanced engines; hydraulic engines; extensive underground haulage by ropes, &c., in place of animal power; improved means of signalling by speaking tubes, electricity, or the telephone, which, by the way, has been tried at Caledonia, but without the call which is absolutely necessary to attract attention when practically used.

Rock boring machines have been used at Montagu and Londonderry, and a hand power borer, the "Victor" at Waverley.

INFRACTIONS OF THE MINES REGULATION CHAPTER.—In late reports references were made to the inattention sometime shown to the requirements of the mining law, and to the neglect through apparent ignorance, which, if remedied when noticed, might be regarded as excusable when it had not resulted seriously; it was also suggested that clemency might possibly be carried too far, and warnings for contravention become to be expected as a matter of right; hence that an example or two, of wilful offenders, would be well in order that *all* engaged in mining might the better realize that the law requires exactly what it states, and allows of no infractions except under pain of penalty.

Impressed with the safeguards which a strict compliance surrounds

the manager whom calamity overtakes and the danger to which it exposes the careless, the advantages of a proper reading of the law and fulfilling its demands by care and good discipline, have been strongly dwelt on in personal dealings with miners even to sometime occasioning individual irritation. In which case the following propositions have been submitted, and the question asked; which would be the most considerate course to pursue:—

Either institute actions for every neglect as the law sanctions; or, only point out the law as one that should be complied with, and have it forgotten till a fatality consequent on a glaring neglect subjects the manager to an action for man-slaughter; or impress the advisability of strict compliance if need be "with all the insolence of office" in cases where matters and practice were observed to be disregarded?

Nor would it be well to overlook that notices of individual neglect have produced beneficial effects, and that exposures have a deterring influence perhaps as salutary in cases of mere inobservance as legal actions would have. Yet, while additional attention to the details of the mining law was noticeable during the past year, there still was apparent an inability to see the necessity, much less the advantages, attending strict compliance—except it might be in a neighbor. So strong was this inability expressed in two cases that came to my notice, that the alternative of legal proceedings alone brought compliance. In one case this view of the law's requirements failed, and an action before two magistrates had consequently to be brought under circumstances which will be shortly mentioned. On the other hand there are managers who better realize the bearing of the Mines Regulation Chapter, and who feel that to protect themselves they must maintain good discipline among their deputies and men. Being made primarily responsible by the act it is incumbent on them to show, "in the event of any contravention of, or non-compliance with any of the rules, by any person whomsoever, that they had taken all reasonable means, and to the best of their power enforced the rules," which can only be done by requiring strict obedience and by punishing wilful offenders. Having this object in view, two actions were brought against working men in Pictou County.

Prosecutions under the Chapter.—In October the public prints of Cape Breton stated that two lads had been run over in the slope of the Clyde Company's workings at Glace Bay, and that one was so severely injured that he was not expected to recover. No report of such an accident having been received, the manager was written to, advised that if the report were correct he had made himself liable to an action for neglect of section 16, and he was requested to immediately report the occurrence. He replied:—"In regard to the accident you made mention of, it was so trifling that it would not be worth reporting. The boys were standing on the landing when the empty tubs went down, and were struck by the tubs and slightly scratched." As this view of the matter did not tally with accounts received from three correspondents and the oral statements of residents of the locality, the manager, Mr. Sutherland, was written to again and informed that if he immediately sent a full and correct account of the accident, no action would be brought against him on

that count. This second opportunity to amend his neglect and escape the penalty for non-compliance produced the following response:—"In reply would say that I sent you an account of the accident already, and have nothing more to add."

This refusal to answer an inquiry legally demanded (see Section 20, [3]) made it appear that in all probability there was something to hide. Then as his imperfect statement did not agree with current report, and as the law had been wilfully set at defiance there was no other course to pursue, and no other way to get at the facts of the case than to bring an action. It being understood that the accident was of such a character as to require reporting, the action was brought for non-compliance with section 16, and as one cause of the accident appeared to be due to the inefficiency of the rapper at the bottom of the slope to warn the bottomer that a rake was away, a second count was laid for non-compliance with the 10th general rule, a third count was also entered for neglect to have the names of the inspector and manager appended to the abstract. This was added for the purpose of showing that *every* requirement of the Chapter must be complied with.

The evidence submitted proved that the lads had been sitting on the turnout guard at the slope bottom, and on hearing the rake approach had jumped up but were overtaken by the tubs, knocked down, bruised and wounded. Both had to be carried out of the pit, and one bleeding from a wound that the medical man partially probed. At first the doctor expressed a very guarded opinion as to the result of the accident to the wounded lad, and advised the manager to report the occurrence. Subsequently the lad rallied from the shock, and it soon appeared that he was in no danger.

In the defence great stress was laid on the accident proving subsequently not to be of so serious a nature as at first feared, but the question at issue was, what it appeared to be within the first 24 hours and not what in time it really proved to be. The magistrates took this view of the case; and as it was represented to them that the action was brought only for the purpose of enforcing the law which was wilfully set at naught, and that it might be an example, they imposed a merely nominal fine with costs. Had the prosecution been non-suited on the ground that the personal injuries were not *serious*, and that was the defence, further action would have been taken under section 20, to show that the inspector had a right to require the information he sought. The section reads that the inspector shall have power, *inter alia*, to make such inquiry as may be necessary to ascertain whether the provisions of the Chapter are complied with, * * * and make inquiry respecting all matters and things connected with, or relating to the safety of the persons employed, * * * and every owner, agent and manager who refuses or neglects to furnish to the inspector the means necessary for making any entry, inspection, examination or inquiry, shall be guilty of an offence against the Chapter. The full wording of this section is evidently intended to cover every imaginable case that might arise, and to assist the inspector in obtaining full information upon every matter that he thinks requires elucidation. Any contrary or restrictive reading should be tested to the uttermost.

The prosecutions in Pictou County were instituted for infractions of the 2nd and 5th General Rules. In one case, at the Vale, a miner followed into his room another who was sent to brush out a capful of gas, without waiting until the place was reported to be safe.

In the second case a workman would not wait at the appointed station, in the Acadia Pit, until the deputy reported, but pressed on into the workings. To enforce his authority, the manager brought an action against the man, rightly judging that if he countenanced a wilful disobedience it would appear to his disadvantage in the event of any inquiry at which he desired to show that he had "enforced to the best of his power" strict discipline in his mine. In both cases the men were fined.

These actions have had a salutary effect on both managers and men, and it is to be hoped will suffice to arouse that attention and discipline that is required: as was before remarked, the great object of the laws' regulations is to improve the mining practice rather than to punish infractions.

RETURNS.—While the returns from the collieries are transmitted with tolerable regularity, those due from gold mining districts are not so much so as is desirable. This is perhaps to be partially accounted for by the difference in the business habits of the two classes respectively engaged; still it is not irremediable. There has also been noticed a laxness on the part of some mill licencees, of some too flagrant to be overlooked. In one case the returns did not tally with the entries in the mill-book; in another case an inspection of the book showed that the entries had not been regularly made, April followed May, and an entry for March only subsequently appeared after an enquiry had been instituted. As an excuse the owner wrote that he had left the mill in charge of somebody else, and that he had not himself been in the mill so far that year. Yet he had taken the following oath, "I, ——, of ——, being the person principally employed in keeping on the premises at ——, used as a Licensed Mill, and whereof I am the licensed mill-owner, the book of accounts prescribed by the Chapter of the Revised Statutes relating to mines and minerals, do hereby swear that the above is a true and correct copy and extract from said book of all the original entries therein tending or referring to the parcels of quartz crushed or reduced at said mill, in respect to which payment of Royalty has this day been made." These cases are noticed to show to what an extent the affirmations to returns may be regarded as mere matters of form, and in the hope that this public mention will suffice, and no future opportunity be given to publish the names of inattentive owners and agents.

BOILER EXPLOSIONS.—"Had I considered the matter at all, I would have thought that the makers knew what was customary for the safety of sets of boilers, and attached the necessary safety-valves, &c." Such was the reply received to a notification that, *inter alia*, one safety-valve, and that festooned with broken castings, was not

sufficient for a set of seven boilers.* It expresses the all too common trust that is put in boiler makers, even when the lowest price is stipulated for what is wanted, a sound boiler, well made, of good material, and contrived to withstand the usage for which it is required. The reply also explains the surprise that is expressed and the explanation so often given when an explosion occurs, that the stoker must be alone to blame for neglect; little thought being had that bad material, poor design or workmanship, or inattention to repairs may have had to do with it.

The sad fatality attending an explosion of a steam boiler at Lingan Colliery, April 26th, described further on in this Report among the accidents, awakened a temporary interest and called forth at the time local comments on the subject of Government inspection and the common management of boilers. Disasters generally arouse public attention to their cause, but unless action be taken while the public mind is drawn to any destructive agent by some unusual sacrifice, the annual slaughter of ones and twos goes on without comment. The management of boilers has been a matter for remark before in these Reports, and some narrow escapes from disastrous consequences mentioned. Throughout the Province explosions of boilers at mills, factories and other establishments employing steam are of annual occurrence, and are passed by and forgotten as soon as they have satisfied a paragraph or two in the local prints. But in view of the late calamity, some general remarks on boiler explosions and their causes, based on the conclusions deduced by inspectors of boilers of long experience, after numerous examinations of exploded boilers and boilers in every conceivable condition wanting repair, and on the results of original experiments may not be considered inopportune.

The miner's want of cheap and efficient power to unwater his mine and raise the produce of his art to the surface was chiefly instrumental in stimulating the application of steam. And the extent to which it is now applied in the kindred operations of mining, smelting and quarrying, may be judged by the proportion of fuel consumed, and the numerous fatal accidents that are recorded to annually occur where such operations are conducted. The annual proportion in Great Britain being about 29 in a total of 66.

While the produce of English Collieries is thus absorbed :—

About Mines	6.72
Steam Power on Land	23.50
Steam Navigation	3.20
On Railways	1.88
Smelting	31.01
At Breweries	1.35
Gas Making	5.87
Domestic Consumption	17.20
Exported	9.27
	100.00

*Since the above was written one of these boilers has exploded and caused one man to be severely scalded. The particulars received are not yet sufficient to say what occasioned the explosion, or how far the manager had really complied with the mining law, to which his compliance had unequivocally been demanded.

Boilers are variously designed to serve different purposes. It may be desired that one have ample steam space, while that another generates steam rapidly, or the consumption of fuel may be a matter of indifference, say at a colliery, or of the utmost importance as in a steamship; a crowded city may demand an economy of space, a matter of no moment in the country. A boiler of the latest patent, with complex fittings and the most approved appliances, may prove economical in the hands of a skilled engineer, if near the shop from which it was issued, but far otherwise in out of the way districts, where other than simple repairs cannot readily be affected. But where boilers are entrusted to men of inferior skill, as they so often have to be, it is felt that the simpler the form and appliances are the better, and the less is the liability to derangement.

The well known axiom, that a chain is no stronger than its weakest link, is also true of boilers; they are no stronger than their weakest point. To find out the many weak points in the construction and management of boilers, and to solve the problem how explosions may be prevented, has been the aim of the several associations established of late years, for the inspection and assurance of steam boilers.

In the early days of steam, when condensing engines were alone used boilers were not required to withstand a heavy pressure, they rarely burst. But on the introduction of high pressure engines, and when the reluctance which was at first felt, to use so powerful an agent, had disappeared, it seemed as though the enormous force stored up in steam of high pressure, was lost sight of, and with the numerous modifications of form and fittings instituted, and blindly copied without due regard to the conditions involved for safety with economy, explosions became frequent.

To account for them mysterious influences were invoked, electricity, the decomposition of steam into its elements, the spheroidal state that water assumes on red hot plates causing a sudden formation of steam on a reduction of temperature, the effect of turning the cold feed water upon red hot plates, or the destruction of the *skin* of the iron plates. This belief in mysterious causes is not yet eradicated from the popular mind; but how much there is of mystery about explosions can best be weighed after examining the results of steam boiler inspection. There is first to be considered the amount of force pent up in an ordinary boiler, and the explosive energy developed at the moment of rupture According to Professors Airey and Rankine, one cubic foot of water at 60 pounds pressure, equals in explosive energy one pound of common gun powder. At the pressure of 60 pounds water has a temperature of 295°, in fact is, for the most part, steam in a liquified state, ready, on release from its bonds, to flash into the gasious state. Water becoming steam at a temperature of 212°, expands 1696 times, and under 60 pounds pressure in a boiler about 470 times. In a case of rupture of a containing vessel, the sudden expansion of a small volume of water into steam, drives back the surrounding air that it displaces. This displaced air acts by atmospheric impact on surrounding bodies, and its destructive force is increased nearly equal to that of its expansion by its immediate return to its original position, on the condensation of the steam. If instead of a rupture the safety valve be opened, the store of heat and its equivalent force in the

heated water, is given up in the form of steam. This may at any time be proved by drawing the fire and opening the safety valve, for not only is the already generated steam released, but the blowing off continues long after the volume of steam above the water has escaped, and until a large portion of the heated water has disappeared. The effect then, whether to be destructive or not, depends entirely on the rapidity of generation, and this, on the character of the orifice or rent that permits the escape of the steam, and the relief of the pressure that restrains the superheated water, *i. e.*, the liquified steam, from asserting itself and exploding into vapor.

Sudden accession of force, at the instant of rupture, has been erroneously supposed in the latter case to take place, and to arise either from the hydrogen generated from the water, decomposed on contact with red hot plates, or from the sudden evolution of steam, either by an accumulation of scale on the sides of the boiler breaking away and allowing the water to come in contact with the overheated plates, or after water thrown on red hot plates had taken the spheroidal form. But the formation of oxide in the first case, would quickly stop decomposition, even supposing the plates were clean enough for it to begin; and further practical experiments with red hot boilers, have failed to produce explosions. In the second case, the surface of overheated plates below an accumulation of scale, could never be sufficiently extensive to appreciably increase the volume of steam, for water requires so many units of heat for its vaporization quite disproportionate to the additional quantity stored up in an over-heated patch of a boiler.

To account for an explosion no solution is more commonly offered than that the cold feed has been turned on when the boiler was red hot from neglect, and the appearance of the plates is pointed to as confirmatory of its correctness. "But," writes Mr. Marten, one of the English inspectors, "far more explosions are attributed to shortness of water than are due to that cause, because it is so easy to be led astray by the appearance of the plates. Even if the feed were turned on when parts were overheated, it is conducted to the bottom and only rises slowly over the surface and cools it gradually. Also the heat stored up in the small area of those plates heated is not enough to raise much water into steam. The experiment of putting cold water into red hot boilers has been repeatedly tried, without producing any explosion. There is no doubt that accumulations of scale are frequent and often cause overheated patches, which break through and cause the displacement or rupture of the boiler, but it is from the weakness of the plate softened by the heat." Yet a deleterious effect from the cold feed water admitted into externally fired boilers is more than suspected from fractures having been developed immediately below it, and in such boilers it is recommended that the feed should be dispersed and not locally injected. This class of boiler is not, as a rule, guaranteed by the Manchester Steam Users' Association. In a letter to the writer the secretary describes externally fired boilers as "treacherous." The Manchester Association was the first established in England and now has over 3000 boilers under inspection. It was the first to dispel the mysteries that shrouded boiler explosions, and to show that by care and attention they were preventible, and not an unavoidable

accompaniment of the use of steam. Since 1865 each boiler enrolled has been guaranteed for £500, and since then, although 25,000 guarantees have been issued, only one boiler of those insured has exploded, and that from the owner having heavily charged the boiler with an anti-incrustation composition and forgotten at the same time to blow off. In the engineer's report for 1876 he showed that 30 explosions had occurred in England that year and caused the death of 88 persons. Of the 30 only 3 arose from shortness of water, and he called attention to it because, he said, "There is a great tendency to attribute the majority of explosions to this cause, and thus remove the onus to the boiler attendant, and to show that these disasters are not preventible." The explosions from shortness of water, moreover, were not severe, and but one person was killed by them. In England there are three other societies similar to that of Manchester, in Germany seven, in the United States the Hartford Company, and its Canadian offshoot at Toronto.

The Boiler Insurance and Steam Power Company of England have about 15,000 boilers under supervision, and make between 50 and 60,000 annual inspections. Of the explosions that occur the engineer states that by far the greater number take place at iron works and mines, that about one-fourth of the whole are due to the negligence of attendants; the remainder, or most of them at least, are the results of defects of construction or condition which could not have escaped the notice of an efficient inspector, and might therefore have been prevented.

The Hartford Company report that during the last ten years 1768 persons were killed and 1904 wounded by 848 explosions in the United States. During the same period the company made 150,042 separate examinations and exposed 16,764 dangerous defects. They now employ twenty-seven inspectors, who devote their whole time to their service. Of the boilers insured by the company, 18 exploded and killed 15 persons. All were accounted for and were due to the attendants or boiler-menders having neglected some ordinary precaution. Four of them were iron work boilers fired by the waste gases; they were improperly hung, being suspended only at the ends and in the middle. For thus suspended, the curvature due to expansion throws the weight entirely on the central support, and when the hanging gives way the boiler breaks. Boilers even fifty feet long have been thus hung, while they should have a support at least every ten feet. Another of the explosions was caused by the water getting low while the piston was being packed of the engine which also drove the plunger; on starting the crown sheets came down. A sixth burst four hours after some repairs had been effected from the neglect to remove a wooden plug temporarily inserted in the steam pipe jug and forgotten. The rule of this company is to take one-sixth of the bursting pressure as the working pressure, or one-half of the actual test.

The Canadian office has been a separate organization for over two years, and is fast extending its field of operations. Already there are in Nova Scotia some eighteen firms who insure their boilers. Over 200 are thus insured throughout the Dominion, and so far without accident. The rate is $1\frac{1}{4}$ per cent on sums up to $10,000, covering damage to the boilers and surrounding property.

The numerous defects inspection has disclosed clearly demonstrate that careful periodical examinations are necessary to detect indications of weakness before it is too late. Internal inspections are requisite to expose grooving, pitting, cracks between rivets, broken and corroded stays, and incrustation over the fire surfaces. Among the causes of defects may be mentioned the use of drift pins to make holes in sheets coincide, by which fractures are occasioned from hole to hole or to the edge of the plate: then a laminated structure in the sheets causes them, not being homogenious, to be bad conductors of heat, and leads to overheating. Neglected leaks, setting not closed in below the water line, insufficient bracing and faulty construction besides scale, sediment, and corrosion, all lead to trouble. Cheap boilers are apt to be deficient in important fittings, though well put together and of good material. A cheap vertical boiler may be without hand holes for the removal of scale and sediment; cheap plain cylindrical boilers, with man holes strengthened, if at all, with cast iron instead of wrought.

Regarding the periodical examinations that are essential for the safe use of steam boilers, the desirability of having those in charge competent to inspect them has been dwelt on as a great safe-guard. The efficiency of even trained attendants, unaccustomed to meet with boilers in every stage of weakness and decline, to accurately judge how long a veteran boiler can be run with safety, or a strained new one can be strengthened, may be doubted; and just as doctors of medicine devote themselves specially to the study of our corporeal boilers and their repairs, while we ourselves are the most interested in keeping them in good running order, yet neglect or overtax their strength, and seek for the doctor's examination and advice, so it seems most probable, however good an idea an attendant may have of the requirements of his boiler, that it is better to leave the examinations to those who make them a special study and a constant occupation. That all boilers should, at least once a year, be carefully inspected in every part appears most plainly necessary from the records of the various boiler insurance companies. Endeavors have consequently been made in England to have inspection made compulsory by law. In 1870 a parliamentary committee took opinions and evidence on the subject, but could not then recommend government inspection, lest it should take away responsibility from the owners. Those interested do not however despair of having some measure on the subject passed; at present the views of the different associations are somewhat conflicting as to the mode which should be adopted. That of Manchester recommends that a competent Court of Inquiry should investigate every case of explosion, in order that the responsibility may be put on the right party. In the case of insurance companies they say: "Our requirements on the discovery of defects must be heeded, or our responsibility ceases." In the case of mines and government inspection, the owner or manager can dissent from a requisition and have his case reviewed before a competent Court of Arbitration. So it seems possible government inspection of boilers could be conducted and relief for oppressive interference found in arbitration.

This subject has perhaps been gone more fully into than may seem

warrantable in a report of this kind, but as it will fall into the hands of many who have to do with boilers, and who hardly know how to go about to acquire the information their inexperience wants, the several matters touched upon have been mentioned, that attention once called to them further inquiries may the more easily be made.

Before quitting this subject a few words may be added on the mysterious skin of iron, and on boiler incrustation the bane of the steam user.

To break a bar even of good iron it is only necessary to cut a nick with either cold chisel or file, and a smart blow breaks it off; but according as the nicking is partial or complete, various crystalline and fibrous fractures it is noticed are produced. It is unnecessary here to do more than refer to them, and to state that they have been explained by the experiments of Kirkaldy, and others, and to add that by plaining out the nicks the tendency to break short off is removed though the bar be in consequence reduced in size. The skin of the iron bar is not then a source of strength, and its destruction the cause of the weakness at the line of nicks. Its bearing on the matter in hand respects the chipping to which the edges of boiler plates are subjected, and the scratches or channels consequently made in the plates by the chipping tool even when in the hands of skilled workmen. The channels and scratches unintentionally made by the chipping tool tend to weaken the plates, and make them susceptible to fracture, as do the nicks intentionally made in the iron bar. To avoid this source of weakness many makers now plane the edges of the plates.

Incrustations.—Scale.—Little of the water available for steam raising is comparatively pure, it all contains some matter either chemically dissolved or mechanically suspended, which is by boiling concentrated or separated out.

The more common substances dissolved in it are the carbonates and sulphates of lime and magnesia and salt. Waters containing carbonates are called "temporary hard," and those holding sulphates in solution "permanently hard."

I. Spring water depends on the composition of the rocks from which it flows for its degree of purity.

II. Surface waters contain large quantities of organic matter, besides mineral substances extracted from the rocks and soils over which they flow.

Ebulition then concentrating the foreign substances contained, the water soon becomes muddy, and unless it be renewed the sediment which is at first thrown to the surface is finally deposited, and is burnt on the plates just as unstirred porridge in a kettle. To escape incrustation in a steam boiler is quite exceptional, and various treatments have been proposed for the removal of scale after its deposition, but it may be accepted as an axiom that the proper treatment is to prevent its formation. Of the many substances tried for loosening scale after formation the more common are soda ash, ammonic chloride and ammonic carbonate, and glutinous matters as horns and hoofs. To prevent the deposition of scale, the water is subjected to a preliminary treatment varying according to its constituents. For softening calcareous waters, Dr. Clarke's method is preferred, which is by the addition of lime water to change the soluble acid calcic-

carbonate into the normal calcic-carbonate, a compound almost insoluble in water. The same effect can be produced by boiling alone when the excess of carbonic acid is expelled and the calcic-carbonate deposited, but ordinarily it is not convenient to first boil water before admitting it into the boiler. In practice the per centage of calcic-carbonate in the water being known, the necessary amount of milk of lime is added to a given quantity, and the precipitant allowed to settle for a day and then the water is drawn off. The following equation explains the process:—

$$H_2 \; Ca \; (CO_3)_2 + Ca \; H_2 \; O_2 = 2 \; Ca \; CO_3 + 2 \; H_2 \; O.$$

Permanently hard waters are less easily and cheaply treated, and should, if possible, be avoided, for a good cheap precipitant of sulphuric acid is difficult to obtain. Perhaps the best is baric chloride, and the process is explained as follows:—

$$2 \; Ba \; Cl_2 + Mg \; SO_4 + Ca \; So_4 = 2 \; Ba \; SO_4 + Mg \; Cl_2 + Ca \; Cl_2.$$

The baric sulphate being insoluble in water is precipitated and allowed to settle before the water is drawn off and used.

III. Sea water contains about $\frac{1}{33}$rd of its own weight of saline matter, and when by evaporation it is saturated it boils at 226° F and contains $\frac{12}{33}$rds of saline matter. In using it in boilers it is unwise to concentrate it beyond $\frac{2}{33}$rds or, what is the same, evaporate more than one half lest the salts form a scale; hence the necessity of removing the salts by frequent blowing off.

This is effected from the surface by scum cocks, and the practice has been general with marine boilers for years. Why it should not be also commonly practised with stationary boilers is strange considering its many advantages.

Besides the waste of fuel occasioned by incrustation, there is the increased wear and tear of boilers that it causes, and the danger likely to accrue from its formation; this has already been referred to. Then the thickening of the water by concentration even when no deposit takes place, is strongly suspected to cause overheating by preventing the escape of steam off the plates. It also acts injuriously by occasioning priming and causing earthy matter to be carried over into the cylinder of the engine.

To prevent incrustation, the most practical method is, in most cases, to avoid "boiler compositions" and adopt some method of getting rid of the sediment. The general custom of blowing off occasionally from one point only at the bottom is local only in its effects and not satisfactory. Some few years ago "Topham pipes" were introduced. They are now much used and are highly spoken of. A pipe perforated at the top and with wings on each side to act like a trough and collect the sediment, is inserted the whole length of the boiler just below the level of the water. By means of a tap in the front end of the boiler in connection with the pipe, it is blown off at least every two hours.

A late invention for collecting scum, adopted at the Emery, commends itself for its simplicity and thoroughness. The engineer,

Mr. Rumble, so modified and improved it that he has applied for an patent for an Improved Boiler Cleaner and Feed Heater.

It may be described generally to consist of a 2 inch pipe, leading from near the bottom of the back end of the boiler, up to an 18 gallon receiver, placed above the boiler and about over the fire-bridge; from the receiver pass two pipes, one to the open, and the other directly downwards through the shell to low water line, where it branches into two transversely placed bell mouths, each having a diameter equal to the difference between high and low water in the boiler. The circuit being made by the necessary valves, a current of water flows through the system in a contrary direction to the order of the above description. Then, as the strongest ebulition occurs where the bell mouths are placed, the scum in the water is thrown to the surface and passes up into the receiver, where it necessarily settles, and from whence it is periodically blown out through the second pipe.

Mineral Oils for Lubricating.—The corrosive action of vegetable and animal oils on iron, when they are acted on by high pressure steam, and decomposed, is well known. Admitted into the cylinder of a high pressure engine for lubricating purposes, these oils become rancid and corrosive, consequent on the fatty acids being separated from their bases and freed to act injuriously on the iron. But mineral oils being without oxygen in their composition, are free from this objection, and as they can be prepared as lubricants for both heavy and light work, and to equal, if not excel organic oils for general use, it is surprising they are not more commonly used. In price, they compare favorably even with tallow. For the large winding engines at the Foord pit, Mr. Hudson speaks in terms of high praise of the quality sold as Valvoline.

Petroleum has also another advantage over organic oils. When the condensed steam carrying the lubricant from the cylinders, is returned into the boiler, it is apt, if an organic oil, to cause foaming in the boiler, not so with a mineral oil, which in addition, is said to be beneficial in the prevention of scale.

Submarine Workings.—There is a popular fallacy that our coal resources are inexhaustible; it is even sometimes asserted that our coal measures cover 18,000 square miles. When it is remembered that that number represents the full area of the Province, a statement that our workable coal fields above high water mark, do not embrace one sixtieth of that area, will not seem so surprising, or that the figures ennumerating the available contents are easy of expression. Few probably are aware how restricted is the Pictou field; so far as proved, its total output, could not do more than supply the trade of Great Britain for four years. If then, the land fields are limited, the greater is the necessity for looking after the sea areas, which sooner or later will tax engineering skill to the uttermost.

The coast sections of Cape Breton and the Gulf shore early demonstrated the probability that the existing coal measures are but remnants of immense fields that now lie submerged under the Atlantic and Gulf of St. Lawrence. Outliers of the latter yet remain at George's Bay,

Newfoundland, at Chimney Corner, Broad Cove, and Port Hood on the Cape Breton coast, at Tracadie, Cariboo and other spots on the south shore of the Straits of Northumberland. Through this field faults have brought to the surface lower carboniferous rocks at the Magdalen Islands, at Margaree Island, Smith's Island off Port Hood, and Pictou Island. Prince Edward Island remaining as a vast tract of undenuded overlying Triassic rocks, may, as the vale of Cheshire similarly related to the coal measures, yet be pierced by coal shafts. Of the southward and eastern extension of the carboniferous rocks along the foreshore of the Atlantic coast, outliers are left in Rhode Island, at Chester Bay and Lennox Passage, besides the available coal field of Cape Breton County, which remains as a considerable portion of the outcrop of what may be called the Atlantic field.

How much of these sub-marine fields may in time be won can at the best be only a small portion of the whole, for the major part must lie buried until time changes the relative positions of land and sea. What proportion of the submerged field will be worked can only be roughly conjectured, for so many unknown quantities enter into the calculation. The thickness and quality of the seams, the faults and troubles to be met with in the workings, the cover to be left for security, the proportion of saleable coal obtained, the increased cost, the engineering difficulties to be surmounted as depth and distance from the operating centres increase, the relative value of labor to that of the fuel produced, these and other considerations have to be better known before an approach to accuracy in any estimate can be made. But basing a calculation on our present knowledge and our prospective ability to meet the anticipated difficulties within a reasonable limit of distance and depth, some idea of the future value of our sub-marine coal fields may be deduced, and the necessity demonstrated for even now so conducting all inshore mining, that ultimate deep sea mining may be safely prosecuted.

Assuming for the present a contour line three miles from shore to be the boundary of profitable working, and four thousand feet the available depth, and that no seam under three feet will be worked, then taking into consideration the minimum cover of solid measures required by our present law, the reduction to be made on account of known anticlinals, and the average thickness of the seams along their shore crops, the sub-marine coal field of Cape Breton, from Mira Bay to Cape Dauphin will yield 1,866,000,000 tons. This estimate assumes that after allowing one-fourteenth for unavoidable loss and waste in working, 1400 tons may be obtained from each foot acre as was assumed in the enquiry by the Royal Commission to ascertain the quantity of coal remaining unwrought in Great Britain. It is made up by calculating separately the area of each seam in each locality, and the figures given are the sum total of all, without allowances for other circumstances than those enumerated. It does not, however, presume to be more than a mere guess at the best, but for want of fuller information is sufficient to show the approximate future value of this field. For all that is yet known, the strata may rise seaward, and distant working be cut off, although this is not so probable, as that workings may be limited by heavy faults. But here the regularity of the measures along the shore indicates no serious

dislocations. The uniform slope of the sea-bottom also negatives a probability of the foreshore being bounded by heavy faults, but rather suggests that the area above water has been reduced by long continued denudation. The seams may thin out or deteriorate, but then again some that are thin and inferior along the crop may thicken and improve in quality to the deep. The proved seams on the land have only to be followed to show how much a seam may change its character and thickness within a mile or two.

As mining must, to a large extent ever remain a matter of accumulated experience, the subjoined information respecting past, present and prospective submarine workings on the English coast is given as of great practical value for us, and as suggestive for our guidance.

Sir George Elliott, who, from a trapper boy, rose by his own ability to be a member of parliament, and one of the most wealthy commoners and extensive coal owners of England, stated before the royal commission, already referred to, that in estimating the quantity of available coal under the sea along the coast of the County of Durham, a distance of only 3½ miles from the shore was taken, but that "he thought it is possible that a much wider extent will ultimately be worked by sinking shafts at a distance from the shore in the sea, especially taking into consideration that this portion of the coal field includes six seams of excellent coal, with an aggregate thickness of 30 feet. This would allow of a further distance, of say seven miles being worked." The Durham submarine field within the 10 mile limit, would then yield 2,200,000,000 tons. Sir George further stated that he actually had worked 2½ miles from shaft, and that he believed at great depths it would be possible to work 5 miles from shaft with shafts 10 miles apart. Respecting barriers between separate winnings, he thought it was not of so much importance under a great depth of cover as that it should not be allowed to take away the coal up to within a certain distance of the bed of the sea. "I feel," he said, "that there should be some mode of dealing with the subject so that parties should not be permitted to work coal under the seas, rivers and estuaries in such a manner as to ruin and destroy a whole district."

Mr. W. Y. Craig, a mining engineer of high repute, when examined *inter alia* on the system of working under the estuary of the Dee gave the following evidence:—"We commenced at first working in the hard five-quarter seam upon the long wall system, and we opened off, leaving about 20 yards of pillar above the air heading; but we were obliged to abandon it. The dip of the measures is one in five, and we found that we could not get stuff to pack the roads without bringing it a considerable distance from the gob. The expense connected with keeping up the gob roads and the packings, caused us to abandon the long wall system, and then we commenced the ten yard drift, or what is commonly called Lancashire system. From each pair of up-brows we drove headings ten yards apart, and after extending those headings from 60 yards to 80 yards on each side of the up-brows, we took back the pillars, two on each side simultaneously. By that means we were able to do without timber, and we found this system of working best suited of any which we had attempted. The roof was very stubborn and when in long wall working it did fall, it generally fell into the

face, causing a considerable loss of coal and expense in re-opening. The stone drift that intersected this, and the other seam of the series under the Dee, began at a depth of 135 yards, and the least cover on these workings was 100 yards. In the next seam working on the same system, all the coal was taken below where the cover was more than 80 yards. Another seam, the Durbog, was wrought on what is called the narrow wicket system. The bords are driven 5 yards wide, and a 5 yard pillar is left. The cut-throughs are about 20 yards apart. This system of working is adopted in order to bring on the creep, so to avoid a sudden fall and fracture of the surface. After it comes on, the district is abandoned for some time to allow it to settle, and then the main roads are re-opened. None of the pillars are taken out, and about 44 per cent. of the coal is entirely lost in pillars. It was not considered safe to work nearer than within 50 yards of the surface.

In working this seam the intention was to come to long wall work when there was 100 yards of cover, and between that and 60 yards of cover to pursue the narrow wicket system, leaving 44 per cent., and not to go beyond 60 yards with any description of work whatever. In the modified long wall which was tried in the lower range, roads in the coal were kept simultaneously going, and 40 to 60 yards of face were taken away, five yards being left on each side of the road, and 20 yard pillars between each two stalls, which are worked off on coming back.

In one or two falls there was a rapid discharge of water, but it took off again. In the bed of the river, at the thinnest part, there are about 14 yards of silt, in another part it is about 40 yards. And in the bed of silt there is a strong bed of clay which is quite impervious, and had it not been for that, Mr. Craig said, he would not have recommended going so near as 60 yards.

In answer to the question:—You heard the evidence as to the desirability of leaving pillars of coal, so that in the event of the sea water coming into any of these workings, the whole coal field might not be sacrificed; do you concur in that opinion?

Mr. Craig replied,—"I think that in working under water, at such shallow depths, there is a degree of uncertainty as to what may be the effect, and in winning out new districts, it would be desirable to have it divided, and to leave barriers."

Mr. T. E. Forster, in his estimate of the quantity of coal remaining unwrought in Northumberland and Cumberland, says:—It is assumed that for a distance of eight miles on the Cumberland coast two workable seams of coal will be found under the sea, making in the aggregate 11 feet of coal over an area of 16 square miles, then taking the extent to be worked seaward 2 miles, and allowing 40 per cent to be left, the available coal will amount to 101,376,000 tons. On the Northumberland coast his estimate takes the extent to be worked seaward 2 miles, and along the coast from the Tyne northward 20 miles, and in this case allowing 25 per cent to be left, the yield will be 403,200,000 tons.

Mr. G. B. Forster stated that he adopted the bord and pillar system of working at Whitehaven; that the face was 2 miles in a line at right angles to the shore and 3 miles from the pit, and about 900 feet below the ocean in that particular spot, though the seam is

worked at all depths from 60 or 70 yards downwards; the seam being 10 feet in thickness. The bords are driven 6 yards wide and the pillars are left 20 yards thick. The first working takes out in the whole 36 per cent, and about 16 per cent more is taken out when the pillars are merely cut through by 5 yard cross cuts, which is done down to a depth of 180 yards. Below that depth all the coal is taken out. At a neighboring colliery at Workington the sea broke in when the whole of the coal was being taken at a slight depth,—not more than 60 yards at the most. It is supposed a gravel bed communicated with the pit to the rise, and that it was not a fair break down of the strata. At Whitehaven the sea bottom is principally rock. Mr. Forster had worked large quantities of the Hutton seam on the Tyne, under the High Main water which was tubbed off, the High Main being exhausted and full of water with a vertical pressure from 70 to 100 fathoms. He was of opinion that it was desirable to have the mines under the sea worked in compartments; certain collieries on the Northumberland coast were with that view kept distinct, and it was proposed to keep a barrier of 40 to 50 yards between each sea face.

Mr. T. L. Cottingham, when describing his system of working under the estuary of the Dee, said the shafts were sunk on the shore of the river and tunnels were driven under it to intersect and work the various seams of coal dipping under it. The coal was worked on the bord and pillar system, the pillars being on an average 20 yards wide and the bords 9 feet wide. The length of the pillars varied from 40 to 50 yards; they were cut through at intervals of 30 yards and subsequently worked back. The depth of the shafts was 166 feet from the surface, and the coal was reached under the river at that depth and worked to the rise, to within about 30 yards of the surface, and practically all was worked out. The bed of the estuary was composed of sand and a stiff red clay, in some places 15 to 16 yards thick, which it was supposed would sink or subside, but would not break through; at any rate they never had the river water in upon them. Mr. J. J. Atkinson thought that 2½ to 3 miles is about the extent which it is desirable to attempt under the sea.

In the estimate of the available coal under the Firth of Forth, Mr. Geddes places it at 1,800,000,000 tons, and off the Ayrshire coast at 158,000,000 tons. Besides these submarine fields there is also a tract off the South Wales coast, which will, it is anticipated, produce a large quantity of coal. Considering then the great stake England has in submarine workings, we cannot do otherwise than regard the experience and expressed opinions of mining engineers and others so largely interested themselves in the future welfare of coal mining under the sea as of the utmost utility and value for us now, when precautionary measures may be easily adopted and their provisions recognized and strictly complied with.

Desirous of benefiting by the large experience of Mr. Richard Brown, late of Sydney Mines, he was written to on this subject April 27th, 1877. In reply he stated:— * * "In my opinion, wherever the overlying measures are perfectly sound and impervious to water, it will be quite safe to drive passage-ways in the seam under a cover of 100 feet, and to take out 50 per cent of the coal under a cover of

300 feet beneath the sea. When the measures consist chiefly of shale free from slips there will be no danger, but where sandstones, which are generally traversed by open joints and cracks, predominate there will be great risk of sea water finding its way into the workings. As an instance of the latter I may mention the Jacobs pit at Sydney, where, when the South levels reached within about 3 chains of the shore, there was such an influx of salt water through cracks in the sandstone roof, that we were obliged to shut off all the South side workings by strong timber dams, although the thickness of cover was 240 feet at the sea level. Again in sinking the new shafts at Lloyd's Cove a heavy feeder of salt water was met at a depth of 257 feet below the surface. Hitherto no workings have been carried on under the sea at Sydney with a less cover than 450 feet. At the Saltern pit, Whitehaven, (where I spent many a weary day years ago), the uppermost of the three seams worked was 62 fathoms below the sea at the shore, under which it dipped at the rate of 1 in 9. Near the shore 36 per cent. of the coal was taken out, but as the cover increased to the dip, the pillars were split, and 28 per cent. more taken out, in all 64 per cent. Now, with a cover of 600 feet, *all* the pillars are removed."

When the first Act relating to Mines and Minerals in this Province was framed, knowledge of the lay of the coal seams of Cape Breton was not so general as it has since become through the labors of Brown, Lesley, Lyman and others. It was then deemed sufficient to leave the definition of any desired area to the individual discretion of the applicant, and merely restrict him as to its length and contents. Consequently many areas have been taken out in irregular shapes and with but little regard for local advantages. In fact, some are perhaps more inconvenient and unsuited for economical working than others would have been, had each field been laid off in squares without at all considering the line of outcrop of the measures. For land areas the system adopted answers well enough perhaps; but now that the general course of the coal beds is approximately known, and the future value of those under the sea recognized it is most apparent that the system is not best suited for the sub-marine. Instead of allowing distinct individuals to take out leases of areas, one beyond the other, it would undoubtedly have been better and more conducive to the interests of the country to have restricted each lessee to a certain frontage on the adjoining coast, taking into consideration the outcrop of the seams rather than a given superficial extent.

Private individuals holding such mineral rights as those reserved by the Crown, would take care as far as possible, that known facilities for access and advantageous working of the whole field should determine the boundaries rather than hap-hazard selection. As the law now reads, the whole of an area can be forfeited for non-working, but not so a part that could not possibly be worked by other than a neighbouring lessee; and this matter is worthy of further consideration.

It is very certain that to work sea areas to the best advantage, operators should be in the possession of the land adjoining, or that a sufficient barrier be left unworked about their pits. In either case that the approaches should not be from workings in common along the shore line, lest water breaking into one panel should get round

landwards, and destroy a whole district. Mr. Forster was of opinion that impervious barriers should be left on the land side or sea barriers would be of no use. In this respect our present law is not very explicit, though its general bearing is in accordance with the experience cited.

In England where the owners of small lots of land are often the owners of the subjacent minerals, thousands of acres of coal are computed by the Royal Commissioners to have been irretrievably lost on account of the awkward position of the lots, the irregularity of the holdings and the refusal of such owners to sell or lease at reasonable rates to those who, working adjacent areas, were at one time in a position to mine them profitably, but who, prevented by extortionate demands from entering on such lands, abandoned their pits. Thus the coal contained was for ever lost to the country, in that the separate lots are too small to warrant the sinking of special pits for its extraction. A waste from such a source in this country was in part met by the Crown reservation in grants of land of coal and other minerals, but warning by such experience may be had, and care taken that areas are leased of such shapes as may be most thoroughly and economically worked, if only the law will permit some discretion in the leasing to be exercised.

To avoid the difficulties which experience in England showed would militate against extensive sea workings, were no safeguards to be now interposed between selfish present interests and the future welfare of the coal industry, section 42 was inserted in the Mines Regulation Chapter of the Fourth Series of the Revised Statutes. Mining was already being conducted under the foreshore of Cape Breton without sufficient regard for the special requirements of the position, when the Legislature sanctioned the section in question. The section proposed to check further damage being done, and to so control incipient operations as to secure approaches to distant sections of the fields. Not that it is likely in our day that the coal lying at extreme depths and in remote districts will be required, or that colliery establishments will be in a position to work outlying sections profitably, but for the benefit of those who will come after us and who otherwise might justly reflect on our short-sighted policy and indifference to the country's future welfare. The coal required by the clause to be left in barriers may be regarded as not necessarily lost for ever, it is only reserved until all the available coal seaward has been won, when, if it be thought expedient, specified sections of the districts now reserved may then be removed. By the Act sections of coal are not destroyed or lost, but only reserved, while were no check put upon operations, instead of small barriers of coal being locked up as it were, whole districts undoubtedly would be endangered or irretrievably lost by a short-sighted system of "developing" property. Considering the extent of Cape Breton's submarine fields, and the shallow depths of many of the seams under water, with extensive croppings of valuable beds even into the sea itself, the extra inducements to pare as close to any prescribed limit as possible, with a consequent increased risk in case of infringement, make it not improbable that a greater thickness of cover than is at present stipulated for may be advisable to ensure

safety. The limit assigned in the act was suggested by the practice pursued on the English coast at Whitehaven, where the overlying measures *appear*, by published sections, to be similar in character to those of Cape Breton. The experience under the estuary of the Dee is of less service, since on our coasts there are no such thick and impervious beds of silt to choke a crowning in should one occur. That a limit of 60 yards of solid measure is excessive few will question, for the risk is so disproportionate to the gain; and as a mistake realised can never be repaired, it is better to err on the side of safety. Further experience in pillar working in existing collieries may even dictate a wider margin as advisable for security.

To enable lessees of submarine areas to gain access to their property, the statute gives them a right to drive tunnels through the measures of adjoining areas. The wording of the clause is so general, that various constructions have been put upon its meaning, no strict interpretation having yet been given The intention of the act is obviously to prevent jealousy or conflicting interest putting obstacles in the way of working areas lying under the sea. It is no less evident that the Legislature did not intend to go beyond this, and grant facilities to the one, to the inconvenience and detriment of the other. In granting the right to tunnel through the land of an adjacent area, the statute says, "doing as little damage as possible," clearly meaning thereby that if there be one means of approach, that will incommode less than another, although it may be the more expensive, that means, in preference to the cheaper, shall be adopted.

Suppose a case, where it is proposed to tunnel through an area half a mile or more seaward;—to drive in the coal would be cheaper and more expeditious than to go through an equally serviceable under or overlying stratum; or again, a slope in a seam might be proposed, when a vertical shaft with a tunnel across the measures, would effect the desired purpose. In the case of steep lying seams, the advantage of access in the coal, might, in some cases, far outweigh the loss that would be occasioned the proprietor of the land area, from which barriers were reserved, and therefore it might not be advisable to define the right to merely driving through coal or other workable beds, and in no case in the beds themselves. But in the first case supposed, the isolation of the approaches in the coal seam would greatly interfere with the working of the inshore area, in fact it is not difficult to foresee such a condition of affairs that would not merely interfere, but actually prevent the working of the inshore area from one set of pits, by cutting the area in two, and making the operations on either side distinct. It may fairly be presumed that the statute is not intended to incommode the prior lessee, nor to cause waste of coal already won, as an interpretation sanctioning such a practice, would necessitate. The question might also be fairly asked, whether overlying drifts within the limit of 180 feet connecting with distant abandoned or drowned out excavations, would not require workings in a subjacent seam to be protected by the thickness of barrier required for security.

When the new Chapter was added to the Statutes which relate to the working of mines, the 40th Section respecting sub-marine workings was incorporated as bearing on a present necessity. At the

same time it was felt that possibly on more mature consideration some modification might be found advisable. The preceding remarks have been made, and authorities quoted on this subject that if possible it may receive due consideration and be fully weighed while there is time to protect the coal interests of the future from further damage, and that the public may see that the matter is not one of mere opinion on one system of working in preference to another, but is of national importance; further, it should be remembered that any restrictions now imposed can at the worst only act as a drag on the development of the coal industry, while the results of neglect or indifference, sanctioning a pennywise system, can never be remedied.

It was, however, felt when the sub-section 40 (3) was framed and submitted without protest on the part of our mining engineers that it probably would require amendment when the coal at great depths was to be won; though it was most essential to protect the frontage and to effectually shut off deep and extensive workings seaward from such as were shallow and liable to irruptions of water. The authorities quoted believe, and the practice at Whitehaven now safely carried on indicate that there is a depth at which all fear of irruption from above may be disregarded. At Whitehaven 60 fathoms is the limit. Mr. Brown and others are quite confident that at 500 feet all the coal can be removed with impunity.

Denudation has been mentioned as the probable cause of the small present size of our coal fields, the continuing action of the sea has therefore to be considered as an element of future insecurity. According to records at different spots along the coast, the rate of denudation appears to be irregular, and the present contour of bays and headlands would lead one to the same conclusion. At several places on the Cape Breton coast the roads have had of late to be moved inland, and the old tracks are even now half or wholly obliterated by the destruction of the cliffs; eight inches to a foot a year is probably the rate at exposed places. At the Joggings, an old plan shows that the rate has been about six inches a year. A large margin in barriers has consequently to be allowed to meet this element.

As bearing on this subject, on some future occasion, I propose to refer to the difficulties now encountered in deep mines and to those to be overcome at extreme depths.

COAL MINING.

Although the total sales of coal in 1877 were nearly 53,000 ton in excess of those of the previous year, the outlook for the future is really no more encouraging for the competing collieries than it was a year ago; and the trade demands not yet being proportionate to the facilities for supply, the small increase has furnished little or no relief. The coal trade along the line of the newly-opened Intercolonial

Railway was not fairly established in 1876, and an increase could with certainty be counted on in addition to the extra quantities required for the use of the railway consequent on its extension. This source, together with the further demands of the Steel Company of Canada, increased the land sales of the Pictou and Cumberland collieries 34,300. The requirements of the railway were estimated in the last Report at 65,000 tons, the actual quantity consumed and stored last year appears in the appended table showing the coal traffic on the line of the Intercolonial Railway. Then in consequence of the combined action of the coal carrying railway companies in the United States, and the exceptionally low rates of freight from the Province, an excess of 46,582 tons over the shipments of 1876, greater than the total increase, went to New York and New England for gas purposes. So that while the land sales' increase could be counted on and the United States' demand regarded as exceptional in face of the heavy tariff, (though of possible continuance this year), the excess in these two branches over the total increase of the past season, was met by losses in the Quebec and West Indian markets, the two most important to command,since they offer the largest fields for extension. To Quebec the shipments were only one-half of what they were in 1875, and to the West Indies not one-quarter of those in 1873.

Our coal trade with the United States is always an interesting feature of the business. In former Reports tables were given of the exports before, during and since the Reciprocity Treaty was in force, and also of the wonderfully rapid increase of Canada's importations of free coal. Statistics for the year 1876-7 will be found among the miscellaneous notes.

The increase of the trade of the past year with the United States was partially due to the low rates of freight and to the railway combination that endeavoured to control the gas coal markets of New York and New England. In and about New York 400,000 tons are annually required for gas-making, and New England consumes 300,000 tons for the same purpose. Formerly England supplied these markets, but of late the railway companies have done so with coal from beyond the Alleghanies. A year ago, in consequence of the stocks in hand being large and trade depression reducing the demand, the quantity expected to be controlled was estimated at 450,000 tons. In March the Pennsylvania and Baltimore and Ohio Railways agreed that the former should have two-thirds and the latter one-third of the business; Youghiogheny coal being excluded. The combination also determined what sections of country each line should supply; the Pennsylvania railway west of Cape Cod, while purchasers to the east must look to Baltimore, where the price was fixed at $4.50 f. o. b. The price at New York being $5.50 for Penn and Westmoreland, and $5.35 for Western Virginia coals. Consumers were dissatisfied with this arrangement and only took from the combination 150,00 tons at New York, and some 80,000 tons in New England, but obtained from England nearly 40,000 tons, from Nova Scotia 118,000 tons, and from the Chesapeake and Ohio Railway, which did not agree to enter the combination but reduced their rates on caking coal to $\frac{3}{4}$ cents per ton per mile, 64,000 tons of Kanawha Valley coals.

A contract for the present year, has been made by the Pennsylvania road, to deliver 275,000 tons at New York, for $5.50, last year's rate, this leaves 150,000 tons open to competition, and should freights not rise, a portion should fall to the exports of Cape Breton. For the following table of comparative cost, I am indebted to Messrs. Perkins & Job.

Year.	American Coal. Contract Prices.	Nova Scotia Coal. Average Cost.
1872.	$7.50	$6.25
1873.	8.25	7.00
1874.	7.50	5.68
1875.	6.50	4.75
1876.	6.00	4.50
1877.	5.50	4.15
1878.	5.50	....

CUMBERLAND COUNTY.

The demand on the line of the Intercolonial Railway for coal, called for an additional output from the Spring Hill Colliery, and which at times was not able to supply the trade. The total produce of the county has been steadily increasing since 1872, and last year exceeded 100,000 tons. Had it not been for an unfortunate fire which destroyed the engine house and much of the machinery at the above named colliery, stopping operations for several weeks, an additional 10,000 would have been added to the output. The supply from this quarter not being yet equal to the demand which its advantageous position should control, the future prospects are immediately more promising than those of other coal counties, and are likely to lead to the establishment of other collieries and to further competition. A comparison of the coal freights on the Intercolonial published in the last report, and those stated in the present, point where further extension of the trade may be expected.

The opening of the Spring Hill and Parrsboro Railway, in August last, put the mines in communication with a more convenient shipping port than Dorchester now is, especially for the local trade of the Minas Basin. The shipping facilities in connection with the road are not yet complete, and only 2,137 tons were put on board at Parrsboro' in 1877. When the road is fully equipped and proper staiths erected, much coal will doubtless find its way over this road.

COLLIERIES.

CUMBERLAND.

Owing to the disastrous fire in the city of St. John, June 22nd, the further development of this colliery was suspended, and the workings closed. At the time the pit room consisted of both east and west levels, a back balance up 260 feet on the east level 500 feet from the slope, and off the balance 6 bords were broken off 5 yards apart. On the west side the coal was brought down in boxes on runners from the bords which were worked off the level to the rise. The seam yielded only

2 feet 9 inches of coal, and the roof had to be brushed to give head room. A plan of the pit workings has been filed.

SEAMAN'S.

The coal mined from this area in the winter season was chiefly used at the Lower Cove grindstone quarries.

JOGGINGS.

As the east levels of the present lift are now not far from the fault which was pierced in working the upper lifts and found to be very heavy, it is not intended to open beyond it at present, but sink for a new lift. To the west the workings are approaching the limits agreed upon, that a sufficient barrier of solid coal may be left between the workings and the shore. A width of 100 yards is to be left unwrought, and the wisdom of leaving so substantial a barrier is apparent on examination of the colliery plans which shows by the position of an old barn yet standing, that within 30 years the cliff has been eroded about 20 feet by the action of the tides and ice of the Bay of Fundy.

The first application in this province of electric signalling in mines, is in the pit of this colliery, wires having been laid up the slope to the engine house, at a comparatively small cost.

SCOTIA.

The workings on the north portion of the seam mined at this colliery extended east 1000 feet, when in June the pumps were withdrawn. At the face of the level the stone parting which at the slope was 10 feet thick, was reduced to 3 feet; still further east 1500 feet, on the Chignecto property, the parting is reduced to 15 inches in thickness. Since June coal has been won from a tunnel driven west on a level with the brook in the direction of the abandoned workings 280 feet distant, where the seams give 5 feet and 30 inches of coal.

SPRING HILL.

Although the output of this colliery was larger by 21,000 tons than that of the previous year, operations in the principal mine were suspended for several weeks during the winter, owing to the destruction of the engine house and heepstead by fire, and the serious damage done to the machinery, much of which had to be renewed. The boilers were repaired and arranged in sets of two, they are fired externally and have two return flues in each. An independent set of two with a distinct brick chimney has been erected at the mouth of the slope preparatory to a new lift.

The east level of the Byers' slope has advanced 35 chains, it branches into both sections of the seam, which, since the serious thickening of the parting have been separately worked. The parting varies in thickness, and at one point almost promised to thin out but still going east it has again thickened. The workings in the two sections are now conducted so that those in the upper are in advance and the pillars robbed before those in the lower. The coal from the bords on this side is now sent down in shoots to the level. On the

west side of the slope the levels are to the barrier, and the pillars on this side have been brought back, except off the upper level in this district, where a considerable area still remains untouched.

Believing that the two slopes were on the same seam, the upper levels were pushed ahead to make connection ; it was then discovered that the east slope workings were in an overlying seam, horizontally distant 60 yards from the other. A most important discovery.

In consequence of the fire the west slope was re-opened, it had been closed on account of heavy stone partings that trouble it, and on working west the available coal was reduced to 4 feet 6 inches in thickness.

Endeavors have been made to follow the 13 feet seam of the series beyond the boundary of the General Mining Association area, but unsuccessfully ; the intermediate 6 feet seam has, however, been traced 12 chains to the east.

As something like one-third of the produce of the Black seam has been going hitherto to the waste heap, it is satisfactory to know that a use for a portion of the duff has been found under the colliery boilers. Doubtless in time a local demand will arise for all the small coal produced, especially if previously prepared by washing. Of the slack coal sorted by the rotary screen, the coarsest portion answers for the locomotive, and finds a sale for stove purposes.

PICTOU COUNTY.

This county shared with Cumberland in the enlarged land sales to the extent of 25,739 tons, but as the total increased trade of the county was less than 9,000 tons, there was consequently a further deficiency in the shipments ; Quebec taking less by 20,000 tons than in 1876, and from the whole Province less than two-thirds of what Pictou supplied in 1875.

The demand at Londonderry has made coking coal and coke making a prominent feature in the trade of this county, and it may be expected to further assist in directing attention to the preparation and utilization of the fine coal mixed with impurities.

During the year important explorations were made to test the extent of certain seams and the relationship between the Albion and Vale sections. In a great measure the results are still private, the explorations and office work having been chiefly performed in the interest of the Acadia Company. The officers of the Vale and Nova Scotia companies also made surveys and search of value, which have been plotted on their plans. On the Pictou Company's area adjoining that of the Halifax on the south and east, a bore hole has been put down on the apparent course of the Foord pit levels in the Main seam in the hope of proving the extension of that valuable seam. The hole has been bored by Logan's Diamond Drill, and it has reached a depth of 1337 feet. At 630 feet a 3 feet seam was pierced, and the explorers hope to reach the Main seam within 1500 feet. Should they not succeed in reaching the seam, a second hole will be put down further to the rise. The drill employed is not intended for boring below

1000 feet, but by counterbalancing the weight of the rods the depth named has been reached and further work expected.

COLLIERIES.

ACADIA.

The adoption of the Woottan plan of burning the duff from the screened slack under one set of the boilers at this colliery was referred to last year. Further trial of the system thoroughly proved its efficiency, and now all the boilers are fired with what hitherto was waste material, and marketable coal saved to the value of about $3,000.

The boilers are arranged in 4 sets of 3 each ; the ash-pit doors are made to fit close, and in the side wall there is a hole 15 inches square which can be closed or opened at will by means of two flap shutters opening inwards. A one inch steam pipe is brought down to the side of the hole, and 5 pipes 15 inches long and $\frac{5}{8}$ths in diameter branch off at right angles from the one-inch pipe and bar the entrance. Each branch pipe has 5 small holes for the emission of steam into the ash-pit. In place of bars, cast (not wrought) iron plates sustain the burning duff. The plates are full of holes double the size on the under to what they are on the upper side. In the pit the third lift is finished and the levels of the fourth are up to the boundary on the north side, showing at the face the very beginning of the fault which in the Nova Scotia slope occurs as an upthrow of 49 feet. On the south side the levels are nearly also to the boundary. The heads through the pillars are now driven narrow, only 5 feet wide, to facilitate the pillar working which is now being proceeded with, taking all but the bottom bench, which is left intact in the fourth lift except where cut by the 4 feet ways for the counterbalance boxes.

A ten ton sample of the Stellar oil coal was mined and sent to Boston.

ALBION.

A connection has been made between the workings of the Deep seam and those of the Foord pit Main, and the steam pump in the deeps in the former done away with, the large engine of the latter taking all the water. Advantage will be taken in the winter season of this connection to draw a scale of fresh air through the Cage pit into the workings of the Foord, and in that way partially relieve the winding shaft at a time when a strong current of cold air is apt to ice up the guides, and so obstruct the passage of the cages. To further meet this evil it may be mentioned that two air furnaces on the bank head were successfully used, warning the intake.

No coal has been cut in the Cage pit since the spring, but in that section of the Deep seam opened by the stone drifts from the Foord pit, a plane-way rises from which two pairs of levels are being driven to the north, five chains apart. At a distance in of eight chains, headings go up to meet the slants from the Cage pit; the face of the uper level is in some four chains further. The two pair of levels are pushed ahead to drain the seam of both water and gas, of the latter

a great deal is given off, and to carry it away a scale of 20,000 feet of air circulates.

The main levels on both sides of the Foord pit are being pushed on, and the coal at both faces looks well. The south side is still some 3,000 feet from the boundary; on this side the second fault pierced by the levels proved a downthrow of 32 feet, while the faults to the rise in the crop workings, off the old stair pit, proved to be upthrows.

The present levels have a westwardly trend inside the faults. On both sides of the pit the seam is well won out; on the south side five back-balances are open, of which only two are working. The upper north level has two back-balances working and two standing, and the level advanced sufficient for another. The lower north level has two working and one in preparation inside the fault which has been previously referred to as deflecting so seriously the course of the level which is now N 69 E, the seam dipping at an angle of 24°. The level keeps the course mentioned for the distance yet driven, over eight chains, and it would almost seem that the northern dip of the seam has been entered on.

The returns respecting the coke made in 44 ovens show that the yield from 21,888 tons of slack was 10,976 tons of coke. These figures are instructive in connection with the erection of coke ovens at Londonderry and the carriage of small coal to be there made into coke.

INTERCOLONIAL.

The south workings from No. 4 slope, though kept open, were not required during the shipping season; the coal mined was taken from the pillars and next the bounding fault on the south and the Acadia barrier on the north of the main slope workings, and also in opening out a new lift.

The slopes for this lift were partly down in 1873, when the disastrous explosion and fire closed the mine. In one of the slopes was found the body of one of the unfortunate victims, still sufficiently preserved in the water to be recognized.

The slopes were down 340 feet and will be extended 120 feet further. On either side counterbalance ways have been driven, leaving 10 yard pillars next the slope, and rooms have been started. In the present working lift the south levels turn westwardly to meet the first upthrow fault which will be pierced at this point to win that section of coal lying between it and the second fault at the foot of No. 4 slope.

The small coal from this mine is sent to Londonderry for coke making, where 42 beehive ovens have been built.

To the deep, and in a line with the main slopes, a trial pit 70 feet deep struck broken ground, which is supposed to be the McCulloch brook fault.

NOVA SCOTIA.

The exploring level, No. 8, was driven 3600 feet from the slope northwardly, and ended in ground very much broken up by faults; the quality of the coal also deteriorated as the level approached the great boundary fault of the field. The actual position of this fault is some 200 feet to the west of where it is shown on the Geological

Survey map, and it just permits the crop of the third seam to be seen at the dam, back of the engine house. It appears to have a heavy underlay to the east, as the bore-hole put down 500 feet at the bottom of the up-cast shaft, cut measures which are evidently lower carboniferous. The tenth level and the other working places on the north side have been abandoned on account of the faulty character of the seam; and the south side only remains open. To prove the coal below the fault mentioned before, as beginning at the Acadia barrier, and cutting off the coal at the face of the slope, an exploring slant was put down 425 feet along the barrier side, the fall coal above the bench was found to be good and 8 feet 10 inches in thickness. From the bottom of this slant a level has been started to test the seam lying next the slant.

The large Cameron pump, before referred to has been moved down to the foot of the slope, now delivers through 1600 feet of pipe, against a head of 766 feet. This is accomplished by a pressure of 40 lbs., the boiler pressure being 60 lbs., and by the pump exhausting into the suction, when it makes 15 strokes per minute, against 14 when exhausting into the return.

VALE.

The successful use of duff under the colliery boilers at the Acadia led to a trial of the screenings from the slack of this mine on the ordinary grate bars, and a subsequent entire adoption of that quality of coal for similar purposes. The combustion is quite as thorough as with a coarser quality, and as the screenings are at present unmarketable, the economy of their use is not inconsiderable.

In the pit, shoots have replaced counter-balances for lowering the coal from the rooms to the levels; in the centre of the headways iron plates 2 feet wide and three sixteenths of an inch thick, are laid down; the shoots are kept full, and the coal being very hard it receives but little damage. On the east level, now in some 600 yards, a nip reduced the seam for a space to 5 feet in thickness. On the other side and beyond the fault, it is 7 feet 6 inches, and although still very hard, somewhat more tender than elsewhere. Further surface explorations indicate that the Lawson fault, which the west level should soon reach, will prove no serious obstacle; and that the McBain seam is really identical with the so-called widow McLean seam, at the confines of the area.

CAPE BRETON COUNTY.

The collieries of Cape Breton supplied less coal than even during the previous year to the several markets enumerated in the tables except to the United States, where an additional 49,000 tons were sent for gas making under the circumstances already mentioned. Owing to this exceptional demand, the total sales were 33,000 tons in excess of 1876, and only 3,000 tons behind the year preceding.

The completion of the Sydney and Louisburg Railway has to be noted, but the shipping arrangements are not yet completed at

Louisburg, where it is contemplated to put up staiths of such modern designs as are compatible with economy.

COLLIERIES.

COLLINS.

The slope has been extended to a length of 1100 feet and is to be continued 400 feet further. The present north levels run but a short distance before they reach the barrier which will be left to guard against percolation of water from the Little Bras d'Or. The ventilation of the pit is at present controlled by the waste heat from the steam pump ; to meet the requirements of more extended workings, a furnace at the foot of a vertical shaft will be built.

A tug has been added to the establishment to tow laden vessels round Boularderie, through the Big Bras d'Or to sea; light vessels entering by the shallower passage of the Little Bras d'Or.

SYDNEY.

Since the strike in 1876, no coal has been drawn from the Queen pit, the output of the past year having been altogether from the new winning, and by the single tub cages, temporarily placed in the pumping shaft. By means of them 15,300 tons were raised in one month ; exceptionally good work. The bords from the Lloyd Cove pits have been driven out under the waters of the harbor, and dips have been started directly under Cranberry Head to win the portion of the great submarine field that lies contiguous to the Head. The plan proposed of winning the coal has been carefully devised, with the view of making these pits available for the extraction of all that their position commands. The pillars left in the first working of this section, are of increased size, being 14 by 33 yards. The workings are dry, and the ventilation is effected through the connection with the Queen pit section to the furnaces.

The sinking at Lloyd's Cove has at last been completed, the hoisting shaft having reached the seam in the autumn, and the work of fitting-up begun. The magnitude of this undertaking has exceeded the anticipations at the commencement in 1866. Mention has been made, in previous reports, of the heavy feeder of water that was met with and which necessitated the shafts being tubbed, and the consequent delays and vast expense. The outlay, it is hoped, will, before long, be warranted by the renewed demands of trade.

Mr. Elliott, the engineer, has devised and applied a float with steam whistle attached, to call attention to both high and low water in the boilers. The float works a ratchet wheel, moving a D valve, and as it requires no stuffing box, it is free from a liability to stick and get out of order.

He has also adapted at the new winning, a modified cradle to hold the pit tubs and empty them on the screens, in such a way that the coal is saved from falling, the breakage consequently reduced, and the use of the ordinary, simple and cheap box tubs continued. The frame of an ordinary cradle, hung on trunnions, is extended a few inches above the tub, and the top is covered by a door, hinged a third of the

way from the back. On the door are catches arranged so that it does not open until the cradle has revolved, and the catches are knocked back on striking the top of the screen.

LINGAN.

The disastrous and fatal boiler explosion at this colliery in April, is described among the accidents and referred to when treating generally of explosions. Besides the sacrifice of life, the destruction of property was large, two other boilers were unseated, and their attachments and fittings demolished. The end of the exploded boiler was thrown a distance of 200 feet on the waste heap.

In the tables of Machinery published last year, the dimensions of the new engine, erected for pumping and hoisting, were given before the engine was put up, and through an oversight the circumference of the drum was given as the diameter,—the engine is geared two to one. A new heapstead has been put up 17 feet high, with four screens, having bars 12 feet long.

As at Sydney all the coal is now weighed from the men on the bank head and also in the wagons. In the pit the principal mining in the spring was on the north side, in rooms off the new level, where there is 5 feet 6 inches of good coal: in the latter part of the year it was chiefly on the south side, and one quarter of the output was from pillars.

VICTORIA.

Orders had been given to close this colliery about the end of the year, but were not received until the day after one of the boilers exploded. The accounts of the explosion are not sufficiently clear to report on it yet, or to say how far the manager had complied with the requirements of the law respecting boilers, since, when they were last seen, unequivocal objection was taken to their condition, and the alternative of compliance with the law or a legal action offered; the former was agreed to by the company, and promised by the manager. Before closing the pit, new dips were opened on the east side, which gave three bords, and on the west side a second counterbalance such as has already been described, gave three bords above, and three below the level.

On the bank-head to facilitate the landing of the tubs, and to save moving the cage for each tub, a balanced platform controlled by a brake, received the upper tub, lowered it to the level of the rails, and returned with an empty tub, to the level of the upper deck of the cage.

INTERNATIONAL.

The working of this colliery was interfered with by a change of ownership, and the output was below the average of late years. This property which nominally stood the bond holders in $1,100,000, was sold at sheriff's sale for $200,000, subject to a claim for over $11,000, for accrued royalty, and a foreclosure of mortgage on a portion of the property, to the amount of $45,000, additional.

Shortly after the destruction of the engine house at Spring Hill, a disastrous fire also destroyed the buildings about the pit of this mine, injured the machinery and two locomotives in the shed at the time.

Both these fires point a lesson, and indicate that there is wisdom in having, when possible, colliery buildings detached.

GLACE BAY.

The new Stirling pits having been completed, levels and headways were opened from them in the Harbor seam and furnished the chief source of supply. When sinking, a feeder of water was cut which occasioned much detention. It was met with about half-shaft, and as it was not tubbed back, nor yet shows any signs of diminishing, it entails considerable expense for pumping.

To reduce the handling and save the coal from as much breakage as possible, the pit tubs are run on a direct double track from the shaft to the shipping wharf.

CALEDONIA.

More than usual was done at this colliery in maintaining the surface plant in working order, and a change was introduced in the style of pit tub used with a view to lessening the breakage of the coal. The tubs adopted have the following dimensions:—Extreme length 7 ft. 10½ in.; inside length 7 ft. 7½ in., inside width 2 ft. 9 in.; inside height, 2 ft.; extreme width, 3 ft. and extreme height 3 ft.; wheel base 2 feet. Tubs of these dimensions replace such as were described on page 52 of the Report for 1872. The advantages connected with the new tubs are lessened height and increased capacity; the disadvantages, that the tracks require to be strengthened and have easier curves.

ONTARIO.

Coal has been taken only from the new lift which gives a winning of 270 feet. To assist in the additional work which a new lift entails, a horizontal boiler has been set.

BLOCKHOUSE.

The coal shipped was mined chiefly from the pillars, which, originally left of good size, yield large coal when removed. The shipping wharf was strengthened by a continuous crib on the east side and now presents a solid face of square timber to the sea.

GOWRIE.

As of late years, a considerable portion of the produce has been from pillars off the lowest level on the east side and immediately east of the main incline off the upper level. The chief workings have been between two and four hundred yards to the west of the incline; fourteen double rooms being worked, and the pillars between them being soon after brought back as previously described. A new self-acting incline, 400 yards in from the present, is fitted up ready for working.

GARDENER.

Coal mining was resumed late in the autumn by Mr. W. Routledge under an agreement with the Merchants' Bank of Canada.

SOUTH HEAD.

The annual output remains very small, and the sales are only local.

THE collieries of the Cape Breton Company remain pumped out and in the same condition as they were a year ago.

VICTORIA COUNTY.

At Hunter's Mountain, Big Baddeck, much labor was mispent digging in on a vertical bed of bituminous shale, by courtesy called coal. Material of similar character has been exposed on the flanks of several hills in the Province, but no where has its quality improved in depth to warrant its extraction, even were it more favorably situated for working. Nor does this spot hold out any better inducements.

NEW CAMPBELLTON.

Mining at this colliery has been conducted on a very reduced scale, the sales being under 1400 tons. The adit previously mentioned as in course of driving, is about completed.

INVERNESS COUNTY.

PORT HOOD.

A few hundred tons were extracted in the autumn from this pit; but no further steps have yet been taken to facilitate shipments from the port, and without proper facilities mining cannot be profitably carried on.

BROAD COVE.

While at the last mentioned locality excellent coal seams lie conveniently situated to the roadstead of Port Hood, the principal portion of the coal field of the county lies to the north of Cape Mabou, and extends from about two miles west of McIsaac's Pond, at Broad Cove to Chimney Corner. The southern, or land portion of the field between the pond and Big River, has been carefully examined, and some 6 seams proved to dip uniformly seaward, at an angle of 12°. At Big River the strike is S. 35° W. nearly parallel to the shore. From it on the 7 Feet seam at a distance of 2,500 feet from high water, a level has been driven westwardly 100 yards. Above the level the land rises and gives a lift of nearly 100 yards on the seam; the lower portion of which, for 40 yards, is opened by a second level, which is used as a return air course. Between the levels headings have been put up every chain. The coal shipped, is conveyed on a wooden tramway to the river's mouth, where it is dumped into lighters, from them it is transferred on board small vessels at anchor in the roadstead.

The quality of the coal mined, appears fully equal to the average Cape Breton coal; it is favorably spoken of for steam purposes. The

area available is undoubtedly large, and for working conveniently disposed, but to successfully compete for the existing trade a colliery here requires shipping facilities, and a secure harbor for vessels. To meet these wants, it is proposed to open McIsaac's pond and protect the entrance by piers, as at Glace Bay, or to run a railway to Whycocomagh and the Strait of Canso.

GOLD MINING.

The produce of the year, 16,882 ounces, has not been equalled since 1870. In the early part of the year the returns from the principal districts were exceptionally good. They stimulated mining and led to extensive prospecting. Not only did Sherbrooke continue to be the leading district, but it produced during the first six months as much as during the whole of the preceding year, and at the rate of its most prosperous season, 1867. Of the other prosperous districts, Caribou exceeded its best yield, that of 1869, by 160 per cent., and Oldham produced 30 per cent. more than in 1870, its best year. The leads from which the exceptional returns were obtained will be found noticed in the following short reviews of each district's operations.

The advantages in gold mining attending the use of high explosives have been already noticed, and also the preference that is given to dynamite after trial of such other compounds as mica powder, rendrock and lithofracteur. The two last mentioned, selling at only two-thirds of the price of dynamite, are still used, as well as black powder, on account of the high price of dynamite. Gold miners will be glad to hear that the British Dynamite Company contemplate establishing a factory near Montreal for the purpose of controlling the trade of high explosives in the Dominion. If this is done the price will probably be reduced to 55 cents per pound.

A trial was made by Mr. McClure, at Waverley, of one of the Victor Hand Power Borers in his mine, which in some respects was satisfactory, but as the drill requires, as at present constructed, at least a width in the stope of three feet, it is suitable only for few leads. It is to be hoped that further trial in suitable localities will be made with this machine-tool which elsewhere has proved decidedly successful.

DISTRICTS.

CARIBOU.

The rich lead discovered on area 629, block II, in the autumn of 1876, held out till July, and by that time had produced 1170 ounces. All the gold was taken from a stope of 40 feet and within a depth of 120 feet. The shoot of rich quartz was vertical and at the line of

junction of a cross-lead. On the adjoining area, 630, a shaft was sunk to a depth of 115 feet without finding paying quartz, and then abandoned. Much prospecting was done in the neighbourhood, some 1500 feet of trenches cut, but no lead of any promise found.

On area 227 the Hyde lead was worked down to a depth of 250 feet in the pumping shaft and stopes worked on both sides. Operations were suddenly brought to a close by the destruction of the mill and hoisting gear by fire. Undaunted by their loss, Messrs. Caffrey are now rebuilding and hope to resume mining early in the spring. In the direct line west of the Hyde lead, and beyond where the strata flatten to 45°, an angling lead was opened by Mr. Touquoy, being 6 inches in thickness and at first yielding from 2 and 3 ounces, it promised well, but did not prove in the end profitable, and was abandoned. He also cut some 4,000 feet of trenches about McLeod's Lake and only exposed one poor 4 inch lead.

On the Jennings lead area, 474, and next the free claim, a 40 feet stope was taken down to 90 feet or more. The lead is 6 inches thick and dips north at about 60°. At one time it yielded well, but was abandoned at the end of the year. During the latter part of the year the returns of the work done on area 20 showed the best results.

MOOSE RIVER.

Workings in this district at one time looked very promising, and the yield from a little flat lying lead, dipping north, and owned by Mr. Hiltz, was very encouraging; but the difficulty of access has interfered with the prospecting and successful working of some of the discoveries. The principal mining was on area 25, where a lead dipping south, from 4 to 12 inches thick, was opened to a depth of 30 feet. Some heavy trenching was done, and in one spot where there was 22 feet of soil.

FIFTEEN MILE STREAM.

Prospecting has been continued by Messrs. Hall and a few others, the surface workings promising well for the labor expended; but the difficulties of access to the district greatly interfere with that economy of working essential to the success of most mining enterprises.

GAY'S RIVER.

Shallow pits were put down to the bed rock on two or three areas, but no paying "runs" appear to have been found except by Mr. Dunlap on area 3, near the mill dam. He sank a slope and got the bed rock under 33 feet of cover. The conglomerate carries little or no gold, but in certain backs the gold seems to have worked down to depths of 3 and 4 feet, and that much of the rock is removed. The runs or depressions in the slate course north-east and south-west, while the backs are about north and south. At the slope mouth Mr. Dunlap put up a five stamp mill, the engine of which also does the pumping.

LAWRENCETOWN.

A few ounces of gold were taken from the cross lead, area 294, and two small lots of quartz from Chezzetcook were crushed in

Crook's mill. In the early part of the summer tributers on Mr. J. H. Townshend's property did remarkably well by mining the "throw" of a large lead in area 280 or thereabouts. Mr. Townsend resumed control of his property and late in the year prepared to work the lead extensively should further trial warrant his doing so. He also had his mill refitted.

MONTAGU.

Hardly any mining was done in this district, though there was much prospecting east of Bendigo, in search of the lead from which the numerous large and rich boulders found widely scattered on the surface must have come.

No work was done on the Cross lead in depth, but a little on the surface, and in the adjoining Sarah lead. Preparations are now being made to try the Cross lead in depth; and another party of tributers have taken Messrs. Lawson's mine on the Belt lead, and are re-opening it. Some work has also been done on the St. Patrick's lead, but the result of all operations shows only a small yield.

OLDHAM.

Operations in the Bonanza (Donaldson's) mine, area 130-1, were suspended in the summer, and only with great reluctance as much money had been expended in putting the mine in order. When the mine was closed, the pumping shaft had reached a depth of 255 feet, and from the bottom stopes rose to the east towards the break. A third pit 120 feet to the west was begun, and close by the dump a small angling lead was opened, which at the surface gave one lot of 26 ounces to the ton, but nothing to pay in depth. It courses N. E. and S. W.

During the spring the Blackie lead was further worked on a length of 300 feet, and in the middle stoped to a depth of 60 feet. The gold was found only in spots and ultimately the workings were abandoned.

Tributers worked in several parts of the district, in the neighborhood of the rich discovery, area 627, on the Hall lead and in the angling leads of the McKenzie and Sterling properties, but without marked success. Late in the year a shaft was put down on the Blue lead near the swamp, to test the intersection of that lead with the Britannia, and at a depth of 74 feet, a tunnel started south to intersect the metals. The Hay or nugget lead was worked to a depth of 80 feet; in width it averages 8 inches, in composition it contains much calcspar, and the average yield is about 6 dwts. It would almost seem that the gold contained had been chiefly concentrated in the one 60 ounce pocket, for no others have since been found.

The produce of the district was largely in excess of any previous year, owing to the discovery, at the eastern end of the district, near Rockhead, on areas 627-8, of a rich lead by Mr. T. N. Baker. Where opened, the lead curves smartly round with the strata, altering its course as much as 50° in a distance of 60 feet; and being on the curve of the anticlinal, its general course is N. and S. The deepest shaft is now down 120 feet, and the stopes extend about 80 feet. The lead is affected by numerous rolls of small size, from 6 inches downwards. The produce of the first five months working was 1280 ounces.

RENFREW.

As of late years, operations in this district have been small. In the winter a little work was done on the Clements lead. Later on the Ophir lead was opened on area 200, to the west of the rich ground, and pumping effected by rods led from the St. Andrew's mill, but the returns were not very satisfactory. Mr. McClure re-opened the McLeod lead on area 369, where nuggetty gold had been obtained years ago, and he erected a ten feet water-wheel to supply power for pumping and hoisting. The lead has averaged about an ounce to the ton. Other work was done on area 318 and 319 on a lead overlying the Preeper.

SHERBROOKE.

The mill returns for the past year show a larger yield than that of any since 1867, when some 9,464 ounces were obtained. In 1877 the amount of gold returned was 8,237 ounces, an excess of 1,103 ounces over the yield of the next best year, 1870, and 3,060 ounces over that of the preceding year.

The Wellington Company continued to regularly work both the Dewar and Wellington leads and opened a promising lead that lies midway between them. The sinking on the former has reached a depth of 420 feet, and the stopes extend west 150 feet and east to the Rockville line. The west stopes are worked by four levels from the inclined shaft, and both over and underhand stoping is practised. The width of lead and rock excavated is 2 feet 9 inches. As the lead lies at the low angle of $45\frac{1}{2}°$, there is a strong tendency for the hanging wall to settle, and therefore to protect the shafts solid blockings of hardwood 5 feet by 3 feet are occasionally put in and care is taken to stow the scaffolds tight.

In the underlying Wellington the stoping still goes down to the west and extends from the shaft 300 feet. The upper stopes have been abandoned as unprofitable. The new intervening Middle lead on area 651 and 653 Block III. is from 8 to 10 inches thick and yields over an ounce to the ton; the width excavated is 3 feet 8 inches.

Mining on the supposed Murray lead on the Alexander property, stopped in January; the party of tributers then took the Try Again, but as the Dewar lead is there only half an inch, though yielding $1\frac{1}{2}$ oz., mining was unprofitable, and they ultimately opened two leads, only 18 inches apart, on area 556.

On the Grape-vine property, the south lead was worked down to 140 feet with stopes extending 150 feet. On the surface it was 20 inches wide, at the bottom it is now reduced to 8 inches, and the streak has been passed through in the west of the workings. Some mining was also carried on in the middle lead, the extension of which is worked on the adjoining areas 616-7 in the Gladstone pit. This pit is down 90 feet, and requires more timber than usual, as the walls are shaken. The lead is about 4 inches thick. A shaft by the same owners was sunk on area 613 to strike the extension of the south lead, and it yielded to them over 2 ounces.

Late in the year a lead was cut on area 631, Block IV., which dipped north, and was 6 inches thick; it promised well, but when the streak reached area 661, Block III, it no longer paid.

On the Dominion property, area 778, Mr. Fraser working down the lead mentioned as opened in the previous year, struck a rich streak that in April yielded 414 ounces from 114 tons, and realized a profit of about $7000. The east shaft pierced the streak at 90 feet, and the next shaft east, on the adjoining area, gave but a modeiate return. Three leads close together were worked, the middle being about 8 inches thick. Adjoining leads were also opened and tried, as the McQuarrie 10 feet to the north on area 778; and another to the south on area 780, showed a number of leads within a width of 12 feet.

The success met with an area 778, induced an attack on the Dominion belt, areas 745-6. A shaft was put down just east of the great Palmerston mine, to take the streak at a depth of 120 feet. The streak dips east at a high angle, and when the old mine was abandoned it was reported to be still rich; it had not been followed below 85 feet on account of water. However after great expense the shaft was got down, but the lead though thick, did not realize the expectations of the adventurers.

At the end of the year preparations were made to open some of leads on the Chicago property.

The Aquadale crusher on the brook running into the north-west Arm, was sold to a Sherbrooke company and renamed the Goldenville. A new crusher was also built on the same brook just above the road.

At Cochran's Hill some work was done on a lead on areas 535 and 585, block LXXVII. during the last half of the year, and the quartz mined 118 tons, yielded when crushed at Melrose about 48 ounces.

STORMONT.

The only mining in this district has been on the same lead reported last year, on area 4, Block II. Besides sinking the shafts an adit was started from the shore on the lead to reach the workings distant about 300 feet. The quartz obtained was shipped to Sherbrooke for treatment, no mill in the district being readily available.

TANGIER.

At Mooseland, mining on the Cumminger lead was stopped in April, and but little prospecting has since been done there. At Tangier Mr. Barton opened one of the leads he exposed by his surface drifts immediately to the north of the alluvial workings of 1867, and he found that in its westward course it curved from the swamp to the southward; just beyond the bend it has been yielding about 3 ozs. to the ton, along a stope of 90 feet; and it averages about 4 inches in thickness. No other mining was done until late in the year, when tributers prospected on the Burlington property and near the river.

From Ecum Secum a lot of four tons was crushed at Tangier which gave over 6 ounces.

UNIACKE.

After refitting the mill, equipping the mine, and doing much dead work at great expense, without being able to make the mine on area 614 pay working expenses, Mr. McClure reluctantly abandoned sinking when the lead had further pinched to 4 inches and declined in value. The main pumping shaft stood at a depth of 260 feet, No.

2 at 235 feet, and No. 3 at 216 feet. The streak also narrowed from 80 to 50 feet in length. At a depth of 130 feet in No. 2 stoping is still carried on towards No 1 on area 647.

Trial workings were conducted by tributers on several properties, and some small lots paid well, but the most promising discovery was made on the Toronto property, area 755 (?) of a three inch lead which at first yielded 4 ounces to the ton.

WAVERLEY.

This, at one time important, district, did not share in the general prosperity, but produced less than in any previous year except 1870. The working in the Union lead on area 169 was steadily continued, but it was found that the fault still caps the lead to the east in depth. The tunnel east has advanced over 100 feet from the easternmost shaft without opening profitable ground.

On the adjoining and underlying Dominion lead work was for a time continued, on area 190, and at a depth of 61 feet in the shaft a tunnel was driven some 70 feet or more to the east before operations were discontinued.

On American hill the shaft sunk to cut the Graham lead went down 64 feet, and from the bottom a tunnel was driven to the Graham, but the latter, instead of dipping as it was expected, proved to be a parallel vein and distant 31 feet, and further to be poor. Much prospecting was done in this section of the district, but without success.

On Laidlaw's Hill a party of tributers found some rich barrels on area 128, which paid them well. On other areas prospectors did not meet with like reward.

WINE HARBOR.

On the Orient, at the Barrasois, mining was carried on during the greater part of the year; the pumping shaft is down 110 feet, from which stopes extend 60 feet under the swamp; to the west a shaft 100 feet deep cut rolls 10 inches thick dipping west, which yielded 15 dwt. The lead is vertical.

On the Barrens the Moore lead was worked until the autumn, and the east shaft reached a depth of 144 feet, stoping extending 130 feet to the west.

In the autumn the principal work was on the Mitchell lead and a connection made with the main tunnel by a branch 51 feet long, by which good drainage was effected. The produce of this district was only half of what it was in 1876, though equal to the average of the two preceding years.

IRON MINING.

So long ago as 1835, Dr. Gesner, when writing on the Geology of Nova Scotia, deplored that the country was fated to import iron while the hills were well known to contain rich ores, easily accessible, and in great quantity. The conditions of trade have not much changed since then, though Government opposition to manufactures in the Colonies has long ceased. Even now after a lapse of more than 40 years, the proportion of home made iron to the quantity imported into Canada is very small. Just as with the coal trade, its history goes back ninety years, and that industry has not yet assumed command of the home market. The struggle to place iron among the manufactures of the Province may be said to have begun fifty years ago, when a Provincial association employed Mr. Cyrus Alger to erect (1826) the Annapolis Iron Works at Moose River. The history of iron working in Nova Scotia began even earlier, and in the first decade of the century a small Catalan forge produced some bar iron from the ores of Nictaux. It is even said that the French had forestalled this undertaking. The first operations at Moose River were hardly established before they were suddenly suspended owing to political causes, but not before "excellent iron had been produced, both pig iron for foundry purposes and refined bar iron." For 33 years the works were closed, and when operations were resumed it was for a short time only, to again be neglected for ten more years. The last attempt to establish these works was spoken of in the Reports of this Department for 1872–3.

The next attempt to utilize the iron ores of the Province was made by the General Mining Association at the Albion Mines, but it did not advance beyond importing some machinery and trying to reduce the East River ore at the foundry. In the attempt the foundrymen became impatient and assisted the furnace to Scotch pigs sufficient to fill the prepared moulds and maintain their reputation as smelters.

Then followed the establishment of iron works at Londonderry in 1850, and about the same time others at Nictaux Falls. The development of those of the former has been noticed in Dawson's Acadian Geology, How's Mineralogy, 1868; by Mr. Selwyn in the Canadian Geological Report of Progress 1873, and the later extensions in my late Reports. The latest improvements and present condition will be presently referred to under the heading Steel Company of Canada. The operations of the latter at Nictaux and their ultimate abandonment are referred to by the two first mentioned authorities. This locality has again come into notice in connection with the building of the Nictaux and Atlantic Railway, and the explorations made in the neighbourhood by Messrs. Stearns and Page.

When the furnace at Moose River was in blast in 1827, ores from Nictaux were mixed with those of the neighborhood. Of the quantity used then, and subsequently when a furnace was erected at the Falls,

the statistics are most incomplete; still it would appear that several thousand tons were mined, chiefly from one bed of shell ore, in Abel Wheelock's orchard. Knowledge of the ores of the district was not confined to one bed; in 1855 Dr. Jackson, State Assayer for Massachusetts wrote:—"One cannot fail to be surprised at the enormous quantities of ore which are already exposed by the numerous openings which have been made. There are several distinct and parallel beds of iron ores which we examined, from four to ten feet in width, extending certainly no less than five miles continuously. * * The supply of iron ores at Nictaux is inexhaustible." Dr. Hayes described a short time before the ores of Nictaux, and spoke of the magnetite on the west side of the river, of the less compact bright red ore of Little River, and the bog ore of the valley. While the two former are very dissimilar in appearance, there can be little doubt but that they and all the intermediate varieties, from the compact, strongly magnetic to the friable fossiliferous red ore, are of the same geological age; the gradation from one variety to another being gradual and dependent on the distance from the seat of metamorphic action.

Mr. Mushet writing to Mr. C. Archibald said:—"The shell ore is quite a novelty, and the magnetic character of some of the pieces, contrasts strongly with the inert state of others to all appearance of similar composition. I have examined it, and find that it is curiously comprised of magnetic, and non-magnetic laminæ. The assay of the former gives 67¾ per cent. of iron, and the latter 54 per cent."

Messrs. Stearns and Page on their arrival in the district in 1870, devoted their attention to the magnetic ores of the Cleveland Mountain, and as far as Lawrencetown, a distance of 6 miles to the west of the river, where the strata are finally cut off by the granite. In the neighbourhood of the river they exposed many beds of ore ranging in width up to 12 feet. The general course of the metalliferous belt is N. 55° E. Six miles east of the river the transition of the magnetites into hæmatites takes place. On Foster's farm, (late N. Parker,) the fossiliferous ore of the character described by Mr. Mushet is met with, and within 100 yards of it in the same course east, red hæmatite makes its first appearance. West from this point on the Canaan road, fossils are abundant in the magnetite, but they become less and less distinct, until beyond the river all trace of them has disappeared from the magnetites. The hæmatite beds have been exposed on the farms of David, John and Ingraham Banks, 4 miles east of Canaan, on the Williams River; and they have also been reported at Aylesford 4 miles further east. One bed is highly fossiliferous, the others are compact and readily cleaved. Meadowvale, where this ore was opened is only some two miles from the Annapolis Railway.

Bog ore of superior quality is found in the valley at several places between the farm of E. Payson at Meadowvale, at J. Wheelock's at Middleton, and on to J. Beales' at Inglesville, a distance of 10 to 12 miles. The ore is of the character called "Pitchy Hydrate," and affords 47 per cent. of iron.

Analyses of some of the magnetites and red hæmatites of this district were published in the report for 1875 on page 61.

STEEL COMPANY OF CANADA.

The works of this Company, at Londonderry, now present a more complete appearance, and the operations of making and working iron have been extensively conducted. One of the two new furnaces was lit and kept in blast 44 weeks, the foundry was busy using about 100 tons of metal per month, puddling was once more resumed, and a rolling mill erected and ran.

To the courtesy of Mr. Jamme, the manager, and Mr. Louis, the analyst, I am indebted for the following data:—

1877.	MINED.	SMELTED.	METAL PRODUCED.
Iron ores,	16,879 tons.	20,270 tons.	9,863 tons.
Ankerite,	1,724 "	1,850 "	
Limestone,	5,164 "	6,520 "	
Coke,		15,970 "	

The best weekly yield was 297 tons.

The furnace in use is 65 feet high and 19 feet in diameter at the boshes. The blast has a pressure of 2–4 lbs. heated in three Cowper Siemens' stoves 800°–1100° Fahr.

The blowing engine has the steam cylinder above the blowing cylinder, which has a stroke of 5 feet and a diameter of 6 feet.

Water is brought in a flume 3460 feet to the blast furnace, and 4060 feet to the rolling mill.

There have been built 6 single puddling furnaces and one double, 2 more double furnaces are in process of construction; and there is 1 heating furnace; in all having a capacity of 20 tons of finished iron per day.

There are two trains of rolls, one 9 inch and one 16 inch trains; two steam hammers, one 20 cwt. and one 50 cwt.

The bar iron made, according to Riehle Bros. tests, is "ductle and fine grained;" Tensile strength 60,000 lbs. per square inch, and elongation 33 per cent. The "Best Best" iron has been used to replace Lowmoor and Swedish iron. The following analyses by Mr. Louis shew the high character of the pig and bar iron:—

	No. 1 Pig Iron.	Siemans' best Bar Iron.
Silicon,	3,621....(part slag)......	.280
Graphitic Carbon,	3,730..................	
Combined Carbon,	.390..................	.096
Sulphur,	.002..................	trace
Phosphorus,	.198..................	.035
Manganese,	1,126..................	.041
Iron,	90,933..................	99.548
	100.000	100.000

There have been erected at the works 42 bee-hive coke ovens having each a capacity of 6 tons of coal. Since October, when coke making was begun, 3,440 tons have been produced from 6,650 tons of coal. Mr. Louis has analysed the coke and he gives the following as its composition:—

COKE FROM ALBION COAL.

Moisture	.85
Fixed organic residue	75.80
Volatile organic matter	1.26
Ash	22.09
	100.00
Sulphur	.397

The principal mining of late has been at Martin's Brook, and the chief source of ore was the stopes above the shallow level, under 80 to 115 feet of cover. The stopes from No. 5, under the shallow level also furnished ore. These levels are in about 2000 feet each. At Cumberland Brook levels were driven, and some work also done at the Folly.

From the furnaces to the mines there is a narrow gauge railway, and the ore trucks are moved by a locomotive. Captain Bryant, the Manager, states that the average number of miners employed was 34, laborers 40, mechanics 10, and boys 5. About the furnaces and workshops about 100 more men were employed.

Mr. Louis has supplied the two following interesting analyses; the first of Psilomelane, an encrusting mineral occasionally found in small aggregations, from whence comes the manganese noticed in the ores of Londonderry; the second of cinder from the blast furnaces.

PSILOMELANE.

$Mn\ O_2$	67.10
$Mn\ O$	10.67
$Cu\ O$	.88
$Fe\ O$	4.09
$Al_2\ O_3$ and trace of $Si\ O_2$	.67
$Ni\ O$ and $Co\ O$	.65
$Ca\ O$	2.49
$Mg\ O$	trace
Insoluble matter $Si\ O_2$ and little $Al_2\ O_3$	4.08
	100.36

BLAST FURNACE CINDER.

Silica	32.35
Alumina	10.74
Ferrous oxide	1.06
Manganese oxide	.44
Lime	47.60
Magnesia	4.01
Potash	.13
Soda	.08
Calcic sulphide	3.15
	99.56

MANGENESE MINING.

The quantity mined in Hants County in 1876, was found, on making local inquiries, to have been 56 tons, instead of 16 as stated. of this amount 47 tons went from Teny Cape, and the rest from Cheverie and Rainy Cove. At Teny Cape, the ore is found at shallow depths in flat lying deposits, and also in small veins.

The produce of the last year was 97 tons, which was sent to New York, where for the best quality $55 per ton was obtained. The Custom House entries show that 78 tons were shipped from Windsor and its outports, valued at $2,459. The average number of hands employed at Teny Cape was 8 men and 4 boys.

Manganese has been found at many spots westward of Teny Cape, and openings have been made on the west side of Walton River, at Rainy Cove and near Cheverie. The explorations of the past year were chiefly near Rainy Cove, under the direction of Mr. R. Kennedy. At the locality selected the surface yielded a good deal of ore, which was washed and hand-picked. Two small contiguous veins of 3 and 4 inches wide, were also exposed, and they promised fairly, but for want of means operations were suspended.

The right to work manganese is not reserved, but belongs to the owner of the soil, who in some cases agrees to lease at one dollar per ton, and grant to the miner the right to make roads, build houses and use what timber he requires for his operations.

LEAD MINING.

At the spot at Caledonia described in the last Report, the work of exploration has been continued; the tunnel into the hill was extended 160 feet, and 10 feet driven on the cross vein without any improvement. The ground above was stoped for 20 feet and below two 6 feet stopes were taken in; then a shaft was sunk 25 feet deep at the river's bank and a tunnel started under the river in hopes of finding an improvement at the intersection of the vein with the change of formation, which is presumed to be near at hand. The shipment on which royalty was paid was 12,700 pounds in 1876. There has since been sent to England about 19,000 lbs. The lead contains sufficient silver to pay for its separation and allow a small return to the miner. The lot mentioned returned $6 for silver. So far the quantity of ore obtained, though excellent in quality, has been small in proportion to the expenditure, and unless larger aggregations of the deposit are soon found work will be discontinued.

At Pembroke the existence of galena disseminated in limestone, has been long known, and some seven years ago explorations were there made, but were shortly abandoned, more on account of the character of the ground than from any discouraging appearance of the deposit.

Prospectors during the past year, drove a tunnel in about 70 feet southwestwardly, near the shaft of the first explorers, without discovering a definite vein, but in spots they found the limestone sprinkled with galena. The tunnel terminated in a pot-hole filled with clay. They then started a shaft a little to the south on rising

ground, but instead of finding bed rock at 20 feet, they had not reached it at 80 feet. Apparently the rock falls off to the south of the brook.

The limestone bed in which the ore occurs, courses apparently S. 75 W. and extends for miles; shoad-stones have been found, it is said, six miles apart. The ore resembles that found at Gay's River, only here it is less segregated, and consequently holds out greater inducements to the prospector.

COPPER MINING.

The explorers at Lochaber report that they collected 40 tons of ore of unknown per centage, from their pits, and from the level driven on the three parallel narrow breaks, called vein No. 5 in the last Report. The breaks carry small bunches of solid ore, and were driven on in hopes of striking a main vein. On the brook side, half a mile away, a tunnel driven into the hill cut a small vein showing copper ore and a large vein composed chiefly of spathic iron ore, similar to the vein in which copper pyrites has lately been found in quantity at Polson's Lake. There, the vein has been opened at the second exposure mentioned in the last Report, and some 240 tons have been extracted. Of this quantity 40 tons were hand-dressed up to 10 per cent of copper, and carted to Antigonish for shipment. The right to the property becoming a matter of dispute work has been temporarily suspended.

In the measures of the lower carboniferous, copper ore is found both nodular and associated with fossil plants; in Pictou County, at the shore close to the County line of Antigonish, at Hopewell on the East River, a little below Durham on the West River, and two miles up from the mouth of Cariboo River; also, on French and Waugh's River's in Colchester County. When Messrs. Alger and Jackson visited this Province, in 1828, the General Mining Association were then exploring for copper at Cariboo; after spending some £271 they abandoned their search in that locality. Dr. Dawson in his Acadian Geology speaks of the work done by the Association, and publishes an analysis of the ore showing besides 40 % of copper, 2.10 % of cobalt.

The ore there is associated with the coaly matter of plants, as it is at all the other localities except French River, where both nodular ore and mineralized plants occur in different beds.

Mr. Patterson, in 1857, got a thirty year's lease of this locality, but then did no more than extract a sample of both qualities to send to England. In return he was advised that the nodular ore was the most valuable and would command a ready sale; but he let the property lie idle till 1866, when some six men were constantly employed during the summer, chiefly in working on the north-west side of the river at a spot where the bank is steep and about 60 feet

high. Shallow drifts and shafts were driven and sunk to prove the deposit, but of the results I have no information. Nor that further work was done until 1876-77, when six months work of twelve men produced according to the statement of Mr. Prendergast, the manager, some 36 casks of ore, each averaging about 900 lbs. Subsequent work for two months yielded 6 more casks averaging 800 lbs. each, or a total of 18½ tons, valued at New York at $120 per ton.

The excavations made extended along the bank about 400 feet, and inlaid over 200 feet, in length they measured nearly 2000 feet.

Across the river some work was also done, but as in 1866 it did not prove so remunerative, only one bed and that small, containing nodules.

On the west side the grey sandstone beds near the top of the bank, carry the nodules disseminated through them to a depth of about four feet, the principal deposit being in a dark grey bed from 8 to 10 inches thick. Owing to the action of subaerial agents, the bed has a greenish caste, and the nodules are coated with carbonate. In composition both the mono and bisulphide occur; Mr. Louis the analyst at Londonderry, was the first to detect the presence of covelline. The nodules are on an average small, not larger than cherries, though some have been found weighing one and a half pounds. When I visited this locality the drifts had so fallen in that it was impossible to estimate the apparent extent of the deposit, but from what was to be seen it appeared not improbable that the nodules were not equally disseminated throughout the bed in which they they are found, but are collected together, as it were, at eddies or banks in the sandstone deposit. Below the grey beds come beds of a reddish color, and below them, close to the river's edge, other grey beds in which are the remains of plants, the tissue of which has become filled with copper pyrites.

At Waugh's River and at other places in the neighbourhood copper ore thus associated has been found. It has been worked on Waugh's River about three-quarters of a mile from New Annan, and in 1877 some eight barrels of ore were collected weighing about 3 tons and valued at $30 per ton.

NON-METALLIC MINERALS.

GYPSUM.

The exports of the past year were larger than those of the preceding, but the declared value was reduced. The shipments of 1877 were :—

	Tons.	Value.	Destination.
Antigonish......	703	$ 803	Canadian Ports.
Baddeck, C. B..	450	..	United States.
" " ..	2,790	..	Quebec.
Mabou, " ..	200	..	"
Cheverie.........	26,205		
Maitland.........	2,610	$ 92,797	United States.
Walton..........	2,284		
Windsor.........	72,009		
Wallace.........	255	$ 255	P. E. Island.

The local consumption of plaster is not known, but is supposed to be small, as the trade is altogether supplied from Dorchester.

BARYTES.

At Five Islands some 23 tons of barytes were mined and used on the spot by the Dolphin manufacturing company.

FREESTONE.

Shipments and manufactures of A. Seaman & Co., Lower Cove, Joggins, Cumberland County, during 1877.

Goods.	Destination.	Quantity.	Value
Grindstones..........	United States,	1113 tons	$15,582
" Frames....	" "	400	800
Grindstones..........	Canada,	75	1050
Scythe whet-stones....	"	750 boxes	825
Grindstones in stock......		550 tons	$ 7,700
" Frames in stock		1500	3000

Pugwash shipped :—

Grindstones..............	3 tons	$ 60
Building stone............	300 tons	2,400

Merigomish shipped :

Grindstones..............	382 tons	$ 4,764

Pictou,—Hogg & McKean's Quarry produced :—

Building stone............	1500 tons	$ 7,500

Wallace shipped :—

Building stone, to	Boston..	1028 tons	$ 3,598
" "	St. John's	522 "	1,827
" "	St. John	125 "	438
" "	Halifax..	442 "	1547
Rubble stone....	St. Peter's C. B.	325 "	400
" "	Charlottetown	1535 "	1,535
Building stone..	"	70 "	225
Rough stone....	"	1903 "	951

LIMESTONE.

Pugwash shipped...............	1342 tons, valued at	$1,610
Antigonish "	220 " "	558

The quantity of limestone quarried for use as a flux at the Londonderry iron furnace, has already been mentioned. The quantities burnt at Shubenacadie and in other parts of the country for lime, are not accurately known; but it is believed that Messrs. McLauchlin & Co., burnt about 3000 tons near Shubenacadie, and other parties in the same neighborhood, about 1000 tons, making in all about 16000 barrels of lime.

PETROLEUM.

Boring for oil at Lake Ainslie having been renewed, that locality was visited, and convincing indications of the existence of petroleum seen. Among those observed and reported to exist are the following: Oil on the surface of the water at certain spots: it is even said to have been noticed in holes cut through the ice for fishing purposes: at any time drops may be collected from fissures in certain of the sandstone beds, and while the sides of the fissures are heavily charged with petroleum, some of the beds exposed on the beach contain sufficient to emit a thick flame when pieces of the stone are thrown on a fire. Last summer oil was noticed when digging for water near Loch Bain.

Surface indications have been traced over a wide area, embracing all the district of Lake Ainslie 12 miles in length, through Skye Glen, on Hay River, and they have been reported from other localities in Inverness.

Operations were commenced in the summer of 1869 near the house of J. McIsaac, though a lease on the adjoining property of McDonald, (Tullock), was granted the previous autumn. The work of boring was proceeded with irregularly, at first by means of a spring-pole, and afterwards with the assistance of a donkey-engine. At a depth of 562 feet oil was "struck," and some was forced out with salt water under a strong pressure of gas, pumping was resorted to, and the escaping gas conducted and burnt under the boiler. The yield of oil being small, The Lake Ainslie Pioneer Oil and Salt Company, determined to bore deeper, and put the hole down at a subsequent time to a depth of 802 feet without further discovery. In the meantime a large engine and better tools were provided, and a new well started three-quarters of a mile away, near the southern end of McIsaac's property, and within 20 feet of the shore. At about 330 feet down

oil and salt water were met with, and the attempts then made to pump the hole failing, nothing was done until 1876, when the hole was tubed, and the boring continued to a depth of 1600 feet, but without success.

A few rods to the south, on McDonald's farm, on the lease of Silver and Payne, a well was begun in May 1877, and at a depth of from 60 to 100 feet oil was obtained, in all about a barrel. Boring this hole will likely be shortly renewed. A fourth hole was started in the autumn by a Pictou company, on a spot a little further to the south, and oil is reported to collect on the surface of the water when the hole is standing. Further work by those interested in the search, is confidently expected during the current year. The oil-bearing rocks are of lower carboniferous age, and it would appear that they have been pierced in the deepest bore-holes, the grey sandstones giving place to red.

ACCIDENTS.

Of those reported, six were attended with fatal results; by explosions of gas six persons were burned; by powder three others were injured, and by an explosion of a steam boiler three were killed. By other means 14 more persons were known to have been either killed or severely wounded during the past year. Seven out of the eight lives lost by the six fatalities were lost in or about collieries, the eighth at a gold mine.

FATAL ACCIDENTS.

1. April 26th—Murdock McDonald, aged 24, single; William McNamara, aged 20, single; John Nearing, aged 56, married. Cause—an explosion of a boiler at Lingan.
2. May 16th—John Bonar, leaving a wife and 5 children. Cause—a fall of stone in a shaft at Sydney Mines.
3. June 20th—John Burchell, aged 22, single. Cause—a fall down a shaft at Sydney Mines.
4. July 3rd—Thomas H. Whidden, aged 22, single. Cause—a fall of a tub in a shaft at Goldenville.
5. November 3rd—David Ferguson, aged 12. Cause—run over by counterbalance on plane-way, Spring Hill.
6. December 13th—J. R. McDonald, aged 26, single. Cause—a fall of roof in the Foord pit, Albion Mines.

EXPLOSIONS OF GAS.

Four explosions of gas were reported to have injured more or less severely six persons. Besides these no others were heard of.

The first happened February 13th, at the Vale. Gas, that

morning, was reported to be in small quantity in a winning headway, and Archibald McDonald was told to brush it out. He was doing so when his partner followed with a naked light on his head, and meeting the gas it fired and burnt them both on the hands and face. Neil McDonald was tried before the Stipendiary Magistrate and fined for disobeying orders. It is by making examples of such cases where instructions are knowingly disobeyed that proper discipline alone can be maintained.

A somewhat similar accident occurred at the Nova Scotia, June 27th. A small accumulation of gas was known to have taken place in a close head while the miners were temporarily absent. They were provided with safety lamps, and Waters proceeded on his return to brush out the gas. He did so, but drove it down upon the loader, Thomas McDonald, in the bord below, where he supposed himself out of harm's way. They were both burned, McDonald only slightly, but Waters severely on the arms.

No trace of gas was ever seen, so far as diligent enquiry could discover, in the workings of the Black seam at Spring Hill, until October 1st, when Henry McNeil was most severely burnt under the following peculiar circumstances in a heading off the lowest east level. Ten yard pillars are left to protect the levels, and the heading was up 55 feet and ahead of the first bord. It had been measured up on the Saturday and no gas discovered. On the Monday morning, McNeil, before beginning work, entered this heading by climbing over the breastwork that protects the level at the foot. He merely entered on the flat place filled up behind the breastwork, a distance of 5 feet, and while there, uncovered, some gas fired and burnt him severely. Immediately above him was a bulkhead put half-way across the place and to within 9 inches of the top, placed to catch any coal rolling down; for the seam is deep and dips at an angle of 40°. That the place could not have been standing full of gas is evident from the accounts of men working in the vicinity, of what they saw and heard, and had it been so the explosion would have done great damage. It is equally clear that the man had not climbed to the face and also that the gas came upon him after he had entered. To account for it in such a place it is supposed that either it was liberated from among the bat under the man's feet, or that a collection of gas at the face had been gently dislodged by the increased circulation due to the slanting of the pit, and brought down over the bulkhead while McNeil was present. That McNeil was injured by an explosion of gas was confirmed on the 13th of the same month, when John Culton, on reaching the face of his heading, fired with his light a small quantity of gas which burnt his right arm. The night watchman affirms that when he visited the place at 4 A. M., he carefully examined but found no gas. Mr. Hall, the manager, speaks confidently of the efficiency of the watchman, and as he himself has had much experience with gas, it is to be hoped that these cases have been sufficient to demonstrate the necessity for exercising that constant care and watchfulness that all mines generating gas require.

An explosion took place in January, 1876, at Lingan, whereby one man was badly burnt, which was not mentioned in the last Report. When knowledge of it came to my ears, enquiry was made and it appeared a letter reporting it had been written, but had miscarried.

EXPLOSION OF A STEAM BOILER.

Steam was got up as usual at Lingan colliery on the morning of April 26th, and at 6 A. M. Murdock McDonald took charge of the boilers and started the pumping engine. Forty minutes later one of the four boilers exploded and caused the instant death of McDonald, and so severely scalded William McNamara and John Nearing that they died during the day. An inquest was held the same day and a verdict given that the boiler burst from over-pressure, but how generated the evidence does not show: it may have been from low water or a sudden generation of steam on foaming. From the disclosure of what facts this verdict was derived, the evidence filed does not clearly show, and as no opportunity was given for me to attend, I am unable to review the evidence. It is only of the condition of the boiler some time after the explosion that I can speak. The boiler was a plain cylindrical one with egg shaped ends; it was 25 feet long, 5 feet in diameter, and made of $\frac{3}{8}$ inch plate. The fractures took place in the end and first ring over the fire. An examination of them showed that one followed completely round the line of rivets connecting the first and second rings of plates, and that another similarly followed the line of rivets between the end and the first ring, except for a foot or so. A fracture broke through the plate of the first ring, and another broke the end in two. The fractures showed one of the end plates to be laminated and that corrosion had reduced the thickness of the plates by grooving around the rivets and pitting about the water line. In one spot a plate was reduced to less than $\frac{3}{16}$, though elsewhere not thinner than $\frac{1}{4}$ of an inch. The boiler had been made in England and been in use $3\frac{1}{2}$ years; it had never been patched. It had been examined, I understood, the previous autumn, with the others, and when a plate had been removed from one, the condition of which was such as to evince an evident desire on the part of the management to keep the boilers in repair and up to the requisite strength. For all that I think it well to express my individual opinion, formed on examination of the plates, which was that had the interior examination been made by an inspector of large experience, this boiler would also have been overhauled, and this deplorable accident probably not have happened. Many of the points touched on in the article on Boiler Explosions in the first part of this Report have a direct bearing on this accident, such as the effect of lamination, corrosion, and the reputed sudden generation of steam, and they are of value in forming a conclusion as to the cause of it. Nor should the character of "treacherous" given to boilers of this class by the Manchester Steam Users' Association be forgotten.

EXPLOSIONS OF POWDER.

A sad accident occurred at the Uniacke gold district in January. A young man named John Patriquin undertook on his own account and contrary to the advice of those with him, to withdraw the tamping of loose sand that covered a charge of dynamite that had missed fire five days before. He had succeeded in removing with the spoon the greater part of the charge when the remainder exploded and drove the spoon into his hand and some sand into his eyes, by

which the unfortunate youth was deprived of the sight of both. This accident shows that dynamite immersed some time in water becomes dangerous to handle, owing probably to the nitro-glycerine separating out from the earth mechanically retaining it. Other cases reported elsewhere and the experience of our own miners strengthen this view, and it may be regarded as confirmed by the precautions issued by the manufacturers respecting the handling of dynamite. In the present case the explosion may be thus explained:—The nitro-glycerine separated, settled and collected in the water and was exploded by the friction of the spoon on the grains of sand.

March 19th, In the mine that the Bonanza Company bought from Donaldson at Oldham, a man named Rolf returned too soon to look at a shot that had hung fire, as he was doubtful whether he had really lit the fuse, when as he was within a few feet the shot went off, and a flying piece of rock struck him, broke his jaw, and badly cut his neck.

Early in July at Caribou a box of detonators carelessly left open in a forge exploded from a spark and slightly injured two men. A broken box of dynamite was also in the forge at the time, but luckily was a few feet away, or probably there would have been no one to tell about the box of detonators. It is only wonderful how often such foolhardiness escapes extreme punishment.

On the 25th of August the sinkers in the shaft at the New Winning, Sydney Mines, had put in three shots and fired them together. On going to the bottom they found one of the dynamite charges had apparently blown out, for it had not lifted the stone. It was then proposed to deepen the hole and re-charge it, and William Day inserted a drill for that purpose, when an explosion occurred and the drill was torn from his hand, injuring it severely. All the sinkers were positive the shot had gone off, but how a portion of it could explode and leave a part of the charge yet in the hole, they could not understand. That but a small part of the charge exploded when the drill was in the hole is clear from the slight effect produced, no stone was broken by it and the drill lifted but a couple of feet. The head sinker, Mr. Walker, suggested that the powder shot next to it had gone off first and split off the top of the hole, taking the upper part of the charge away, which consequently would explode alone and leave the remainder unexploded in the bottom of the hole. He was led to this conclusion by the men finding *black* water in the hole. As a confirmation of this explanation, I have since seen it stated that similar mishaps are not uncommon in quarries where a number of shots are arranged to fire at the same time. In explanation it was supposed that one shot going off first dislocated the upper part of an adjoining shot sufficiently to prevent the lower portion of the charge from exploding with the upper attached to the fuse.

SHAFT ACCIDENTS.

May 16th. The sinking of the winding shaft at Lloyd's Cove, Sydney Mines, was performed by three shifts of men, under the guidance of a master sinker and a chargeman for each shift.

The shaft had been tubbed, as has been mentioned, down to the first impermiable bed, below that cribbing was put in at all weak

spots, as the sinking went down, and every Saturday three men spent some four hours 'shaking' the shaft, *i. e.* sounding the rock for loose pieces, and examining for any scaling off of the strata. This had been done on May 12th, and two half cribs put in at weak places. Deeson, the man in charge of the shaking party, two days after told the head sinker that there was another weak spot, but that he did not think it so bad as to require immediate attention, especially as it was determined to begin regularly cribbing the shaft the following week. On the Wednesday night following, while the shift composed of six men were at work, a piece of shale became detached, fell and broke a bunton, and a fragment of it struck the chargeman, John Bonar, on the head, and instantly killed him. One of the other men at the same time received a scalp wound. At the inquest it appeared probable that the fallen piece came from the spot referred to by Deeson, 60 feet from the bottom. As regards the precautions taken, it was stated in the evidence that they were the same as had been along from the beginning in 1866, and no similar accident had hitherto happened. It was also said that complaints had more than once been made that the state of the pit was not safe, and one of the witnesses expressed an opinion that the 'shaking' was not thorough. In consequence of such evidence, the jury requested the coroner to call my attention specially to the case. Accordingly I held an inquiry, at which the officials and a representative from each shift of men appeared. As far as possible the evidence was reviewed, and the opinions of the sinkers obtained from their representatives. But it seemed that in no case had any matter brought to the attention of those in charge been neglected, and that, the jury were misled by the word 'complaint' having been used by the men, to express an opinion that certain matters required attending to. The liability of the officials was acknowledged, the head sinker being in full charge under the engineer. I explained that had the manager or engineer interfered when a question of safety was raised, they would have relieved the head sinker and the chargeman of their responsibility. In this case they had not done so, and the question of blame or error in judgment, then rested with the latter. The chargemen Deeson in his evidence, stated that he told Mr. Walker on Monday, that a certain spot was not safe without cribbing. He did not come before me when Walker said that Deeson qualified his report by remarking that he did not think it so bad as to require immediate attention, a qualifying clause I am inclined to regard as probably made, considering Deeson did not make his report until one or more shifts had been at work, after he had made his examination.

The men who examined the shaft were selected, because of their experience, and if they erred in judgment, they subjected themselves to the same risks to which they exposed their fellow-workmen. That any of the sinkers had protested against any practice or complained of any neglect, I could get no direct evidence, and consequently concluded either that the dangerous character of the spot noticed by Deeson, had been underestimated, or that its character had not been impressed with sufficient clearness on the head sinker.

June 20th, John Burchell was employed driving the horse in the gin, by which two men at work repairing the pump collarings in the Queen pit, were lowered down.

While the waiter-on at the shaft top was tying a piece of timber across the opening, to prevent the gin rope from chafing, Burchell walked over to the top and stood looking at him.

The waiter-on heard Burchell give a quick cry, and looking up saw him in the act of falling. He fell to the bottom a distance of 360 feet.

It is presumed that he must have had a return of the fits to which he had been subject some years before, otherwise it is supposed had he only tripped over an obstacle, he could not have failed to have caught the planking over the shaft top, as the portion uncovered was so small.

July 3rd, The third fatal accident in shafts occurred in a gold mine at Sherbrooke.

A young man named Whidden, had only been about Goldenville a few weeks, when he was employed to fill the tubs at the bottom of the gin shaft, on the Dewar lead. He was instructed to get out of the bottom when the tubs were going up, yet more than once neglected to do so. Even on the morning of the 3rd July, he had been again warned, but either believing himself secure, or deterred by the trouble of getting in and out of the bottom, he continued to remain; and as it most unfortunately occurred, he was at the bottom when the rope happened to break and drop the loaded tub on him. The injuries he received resulted in his death within a few hours.

FALLS OF STONE AND MINERALS.

Reports were received from Londonderry in January and October, of falls of iron ore in the stopes having injured two men severely. The character of the ore is such, that in taking it down, a miner may be at times deceived as to the quantity his operations may loosen, and hence it is only experience and judicious timbering that can guard against accidents from this source.

The fifth accident which terminated fatally, was occasioned by a fall of stone in the Foord pit, December 13th. The timbering of the places is done by the men themselves in this pit, though the timber is delivered to them. An examination of McDonald's place showed that the 'lype' from which the stone broke away, over-ran a boom that had been put up, but not properly set in the coal, so that when the weight came on the boom, the coal gave way. The instructions to the colliers are to cut the holes for the booms not less than 6 inches deep. In this case the Deputy found the hole to be only three inches deep.

MISCELLANEOUS CASUALTIES.

February 15th, Alexander Gillies, 13 years of age, jumped on the rake after it had started from the bottom of the plane in the Cage pit, Albion Mines, and in getting off before it stopped at the top, slipped and was run over. One of his legs had in consequence to be amputated. Riding on the rake is forbidden by the rules of the colliery, hence the boy's desire to get off before he was caught at the top.

June 9th, William Cathcart met with serious injuries in a most foolhardy way. It seems that to save himself from going round the

bottom of the shaft at the International, as his duties as bottomer required him first on one side and then on the other, he occasionally took a short cut through the bottom while the cage was in the shaft. This day the cage caught him, luckily only by the leg, or his chances of recovery would have been slight indeed. The manager reported that he had been repeatedly warned not to pass under the cage. One warning to an ignorant man put in such a position should be sufficient; repetition showed that he was unfit to obey orders and consequently for the post. Infractions of orders, though followed by warnings and only warnings, hardly speak well for the discipline established.

Two pit driver boys sustained simple fractures of limbs at the Blockhouse and Sydney collieries in consequence of a misplaced switch in the former causing a tub to jam the boy against a pillar, and in the second of a dislodged cap piece striking the lad on the arm.

An accident occurred to a young woman at the Foord Pit by machinery; she having been taken by a friendly fireman into the pumping engine house and out on the top overlooking the pit where the great beam reciprocates. Looking down while the engine was making the out-door stroke, the catch pin struck her on the head and caught her against one of the sheer legs, inflicting injuries from which she was not at first expected to recover. The place was difficult of access and not a proper one to which to take strangers and certainly not women.

In the Foord Pit, December 15th, a man travelling on the main level was caught between an empty and a full rake of tubs and had his hip dislocated.

November 3rd. A boy named David Ferguson, employed as a trapper in the Spring Hill pit, left his door for some unknown reason, and climbed up the balance way where he had no business to go. He was most unfortunately met by the counterbalance box, run over, and killed.

TABLES.

In conclusion, attention may be directed to the tables of Total Production of Coal from 1875 to 1876, and the General and District Annual Summaries of Gold, published for reference in the last report, and not republished in this.

I have the honor to be, Sir,

Your obedient Servant,

HENRY S. POOLE,

Inspector of Mines.

LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	Lessee.	District.	Area Sq. Miles.	
	COPPER.			
	COLCHESTER CO.			
	Moir, Wm. C et al	Tatamagouche	$10\frac{1}{2}$	
	LEAD.			
	HALIFAX CO.			
1	McClure, Charles F	Gay's River	1	
	IRON.			
	PICTOU CO.			
32, 33, 34, 36, 37, 38, 40, 41	Hamilton, John and others	East River	9	
39	Hudson, James	"	1	
35	Carmichael, John R	"	1	
	CAPE BRETON CO.			
84	Protheroe, Pryse	Cow Bay	1	
	INVERNESS CO.			
16	Inverness C. I. & R. Co	Whycocomagh	1	

Total area under lease............$24\frac{1}{2}$ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		ANTIGONISH CO.				
1	McKinnon, et al.		3			
		CUMBERLAND CO.				
44	Baker, John W.		1			
13, 14, 15	Black, C. H. M.		3			
21	Blight, James, et al.		1			
11	Bradley, Benj.		1		John Moffat	River Hebert.
25	Campbell, Alex., et al		1			
32, 34	Campbell, Alex., et al		2			
35	Campbell, Alex.		1			
31,33,37,38,40,41,45,46	Campbell, John.		8			
12	Cumberland C. M. Co.		4			
17	Domville, James		3		E. N. Sharp	St. John, N. B.
	General Mining Association.		4			
	Joggins C. M. Association	Joggins.	2	working	B B. Barnhill *Robert Redpath*	Joggins.
	Joggins C. M. Co.	Cumberland.	2			
20	Kirby, Lewis R.		1			
18, 19	Livesey, John		2			
5	Lawson C. M. Association	Maccan.	1			
42	Macfarlane, Alex.		1			
1, 2, 3, 4	New York & Acadia Co.	Scotia.	4	working	William Bennett	Maccan.

43	Pugwash & Spring Hill R. Co.	....	1			
16	Seaman, Gilbert..........	....	1			
24	Shannon, S. L...........	....	2			
36, 39	Shannot, S. L., (in trust) et al	....	2			
6, 7, 8	Spring Hill Mining Co.....	Spring Hill......	3	working	*William Hall*.....	Spring Hill.
22, 23, 28, 29, 30	Styles Mining Co., (Limited)	....	5		J. S. Hickman.....	Amherst.
9	Victoria Coal Mining Co. ...	....	2			
26, 27	Wright, John V..........	....	3			
			61			
		Pictou Co.				
1	Acadia Coal Co..........	Fraser..........	1			
3	" " "	Acadia..........	1	working	Jesse Hoyt.......	Stellarton.
19, 21, 22	" " "	Pictou..........	4			
23	Allan, Sir Hugh, Kt.......	Vale............	3	working	J. B. Moore..... *John Greener*...	New Glasgow. Vale Colliery.
10	Gray, B. G..............	....	1			
11	Haliburton, R. G., et al....	....	1			
	Halifax Company, (Limited)	Albion..........	4		S. Cunard & Co.. *James Hudson*..	Halifax. Stellarton.
13, 14	Intercolonial Company.....	....	2			
12	" "	Drummond......	1	working	Robert Simpson....	Westville.
6	Kirby, Lewis R., et al......	....	1			
15, 30, 31	Merigomish Company......	....	3			
25	Nova Scotia Company.....	Black Diamond...	4	working	W. W. White......	Westville.
20	Price, D. E., et al.........	....	2			
24	Richey, M. H............	....	1			
			29			

LIST OF COAL LEASES.—*Continued.*

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		CAPE BRETON CO.				
3	Archibald, Blowers........	Gowrie..........	1	working	Archibald & Co..	North Sydney.
2	Archibald, Thos. D........	"	1		*Chas. Archibald*..	Cow Bay.
5, 28	Blockhouse Mining Co.....	Blockhouse	2	working	R. Belloni	Cow Bay.
29	" " *(sea area)*	....	1			
72	Brookman, Samuel........	....	1			
76, 77	" S., et al........	....	2			
15	Caledonia, C. & R. Co......	Caledonia.	1	working	David MacKeen....	Caledonia Mines
31	" *(sea area)*......	....	1			
30	Campbell, Alex...........	....	1		T. D. Archibald ...	North Sydney.
23, 25, 70	Cape Breton Co., (Limited)..	....	3		Edgar Stirling.....	Sydney.
14, 24	" " " " ..	Schooner Pond....	2		"	
49	" " " " ..	Reserve.	1		"	
64, 65, 68	" " " " ..	Lorway	3		"	
69	" " " " ..	Emery	1		"	
8, 9	Clyde Coal Mining Co.....	Ontario	1½	working	*John Sutherland* ..	Port Caledonia.
	General Mining Association.	Bridgeport........	2			
	" " "	Sydney..........	5	working	*Rich'd H. Brown*.	Sydney Mines.
	" " "	"	12		Cunard & Morrow	Halifax.
27	" " *(sea area)*	"	5			
	" " "	Lingan..........	10	working	*Donald Lynk*......	Lingan.
	" " "	"	4			
38, 39	" *(sea areas)*	"	16			
10, 21	Gibson, John, et al........	....	2			

4, 12, 16	Glace Bay Mining Co.	Glace Bay	3	working	E. P. Archbold *Henry Mitchell*	Halifax. Little Glace Bay
75	Henry, W. A.		1			
22	Ingraham, R. J. & J. L.	Halfway	1			
6, 13, 18, 19	International C. & R. Co.	International	4	working	Dodd & Gillies *Patrick Neville*	Sydney. Bridgeport.
71	Jennings, Edward		1			
47	LeCras & McInnes		1			
66	Merchant's Bank of Canada	Gardener	2		William Routledge	Bridgeport.
74	Moore & Moseley		$1\frac{1}{4}$			
81	Morton, Lemuel J.		1			
80	McDonald, James		1			
52, 53	McLeod, Hugh		2			
83, 85	Protheroe, Pryse		2			
73, 82	Reid, Thos. S., *(sea areas)*		2			
40, 41, 42	Ross, H. E., et al		3			Point Aconi.
79	Ross, W. J., et al *(sea area)*		1			
43	South Head Coal Co.	South Head	1	working	*James Baird*	Cow Bay.
32	Sword, Wm., *(sea area)*		3			
54 to 63	Sydney, C. M. Co., *(sea areas)*		10			
46	Todd, A. Thornton	Collins	1	working	S. N. Robinson *George Scott*	North Sydney. Little Bras d'Or.
67	Weatherbe & Kirby		1			
78	Weatherbe, R. L., *(sea area)*		5			
34, 35, 36	Victoria C. M. Co., "	Victoria	5	working	Joseph Salter	Low Point.
50, 51	" " "		2			
			$126\frac{3}{4}$			
		INVERNESS CO.				
5	Aylmer, John Evans Freke	Cape Mabou	2			
8	Evans, Thomas	Chimney Corner	1			
9	Evans, Thomas, *(sea area)*		1			

LIST OF COAL LEASES.—*Continued.*

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager.*	Postal Address.
7, 12	Inverness C. I. & R. Co.		2	working	Alex. Wright	Broad Cove.
13	Murray, George	Port Hood	3	working	John P. Lawson	Port Hood.
4	Richey, M. H., et al.		1			
11	Ross, W. J.	Broad Cove	1			
6	Ross, H. E., et al *(sea area)*		1			
14, 15	Smyth, Peter		2			
10	Tremain, E. D., *(sea area)*		1			
			15			
		Richmond Co.				
2	Marmaud, A. E.	Little River	1			
		Victoria Co.				
2	Campbell, Charles J.	New Campbellton.	3	working	John Macdonald	N. Campbellton.
3, 4, 5	Ross, Hon. William	Black Rock	5			
			8			

Total area under lease............$243\frac{3}{4}$ square miles.

COAL TRADE BY COUNTIES.

TABLE A.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter	12,769	11,509	76,793	33,583	30,225	2,751	360	......	120,147	47,843
2nd Quarter	28,879	26,595	70,467	55,068	80,639	63,903	1,350	513	181,335	146,079
3rd Quarter	30,071	27,203	80,317	114,888	137,046	148,451	1,103	247	248,537	290,789
4th Quarter	35,285	33,771	78,900	80,616	92,506	86,876	786	1,091	207,477	202,354
Total	107,004	99,078	306,477	284,155	340,416	301,981	3,599	1,851	757,496	687,065
1876	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,646	634,207
1875	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795
1874	51,580	49,599	410,876	357,926	404,268	337,016	5,996	4,586	872,720	749,127

COAL TRADE BY COUNTIES.
TABLE B.

Markets.	Cumberland.		Pictou.		Cape Breton.		Other Count's.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.....	12,143	3,263	51,441	36,534	1,587	4,981	4	2	65,175	44,780	109,955
Sea-borne	912	90	46,612	10,293	83,239	3,338	1,351	....	132,114	13,721	145,835
Nova Scotia—Total..	13,055	3,353	98,053	46,827	84,826	8,319	1,355	2	197,289	58,501	255,790
Quebec............	....	....	64,709	288	29,906	....	215	....	94,830	288	95,118
New Brunswick....	68,241	14,081	6,716	1,945	13,623	....	212	....	88,792	16,026	104,818
Newfoundland.......	....	....	1,413	22	47,629	262	16	....	49,058	284	49,342
P. E. Island.........	....	....	14,669	23,243	6,114	1,092	51	....	20,834	24,335	45,169
United States.......	348	....	21,118	123	87,029	9,598	......	....	108,495	9,721	118,216
West Indies........	....	....	4,756	....	8,904	....	......	....	13,660	....	13,660
S. America	....	....	273	....	300	....	......	....	573	....	573
Europe	....	....	....	....	4,379	....	......	....	4,379	....	4,379
Total..........	81,644	17,434	211,707	72,448	282,710	19,271	1,849	2	577,910	109,155	687,065
1876..........	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207
1875..........	50,015	10,929	280,551	56,551	287,257	17,445	4,047	....	621,870	84,925	706,795
1874..........	40,492	9,107	302,341	55,585	312,310	24,706	4,538	48	659,681	89,446	749,127

COAL SALES.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1877.	1876.
Nova Scotia—						
Land Sales..	38,518	17,509	13,067	40,861	109,955	80,411
Seaborne....	946	28,168	67,992	48,729	145,835	145,247
Nova Scotia Total	39,464	45,677	81,059	89,590	255,790	225,658
Quebec.........	......	20,808	61,960	12,350	95,118	117,303
New Brunswick..	7,854	28,638	32,434	35,892	104,818	101,890
Newfoundland...	525	9,577	20,300	18,940	49,342	51,742
P. E. Island......	......	7,712	24,052	13,405	45,169	46,908
United States....	......	29,515	68,795	19,906	118,216	71,634
West Indies......	......	3,618	1,121	8,921	13,660	17,971
S. America......	......	......	......	573	573	......
Europe..........	......	534	1,068	2,777	4,379	1,101
Total......	47,843	146,079	290,789	202,354	687,065	634,207
1876........	32,607	161,788	260,250	179,562	634,207	634,207
1875........	31,788	161,421	328,154	185,432	706,795	706,795

COAL.—GENERAL STATEMENT.

1877.	Produce.	Sales.	Colliery Consumption.
1st Quarter..............Tons.	120,147	47,843	26,749
2nd " .... "	181,335	146,079	23,192
3rd " .... "	248,537	290,789	22,211
4th " .... "	207,477	202,354	26,689
Total..................	757,496	687,065	98,841
Total..............1876	709,646	634,207	113,788
Total..............1875	781,165	706,795	124,110
Total..............1874	872,720	749,127	119,582

NOTE.—Stocks on hand at the end of the year 17,060 tons.

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31, 1877.

Collieries.	Seams.	Produce.	Sales.				Colliery Consumption.		
			Bearing Royalty.	Free.	Total.	Per Centage.	Engines.	Workmen.	Per Centage.
CUMBERLAND COUNTY.									
Cumberland	Cumberland	1,432	825	90	915	63	292	7	20
Joggins	Joggins	10,223	9,595	638	10,233	100	800	208	9
Scotia	North	1,213	1,218	86	1,304	107	114	....	9
Seaman	....	530	180	350	530	100	....	....	....
Spring Hill	....	93,606	69,826	16,270	86,096	92	4,380	1,535	6
PICTOU COUNTY.									
Acadia	Acadia	63,101	47,163	13,225	60,388	95	1,565	1,540	5
Albion Mines	Deep Main	20,792 95,243	69,817	40,265	110,082	94	13,714	3,900	15
Intercolonial	Acadia	57,827	47,420	8,395	55,815	98	1,750	1,117	5
Nova Scotia	Acadia	27,001	16,963	4,617	21,580	79	4,221	667	18
Vale	McBean	42,513	30,344	5,946	36,290	85	2,200	943	7
CAPE BRETON COUNTY.									
Block-house	Block-house	61,938	56,961	616	57,577	92	2,700	1,450	6
Caledonia	Phelan	26,197	18,724	4,516	23,248	86	653	594	4
Collins	Collins	7,768	6,362	1,141	7,503	96	1,824	1,145	38
Emery	Emery	....	....	131	131	....	1,744	239	....
Gardener	Lorway	3,540 ?	3,520	265	3,785	106	2,970	580	100 ?
Glace Bay	Harbor	36,295	34,665	711	35,376	97	3,626	1,270	13
Gowrie	McAulay	28,154	19,764	5,087	24,851	88	1,642	2,566	14
International	Harbor	18,346	17,510	145	17,655	96	1,775	1,836	19
Lingan	Lingan	21,054	17,463	1,667	19,130	90	2,428	806	15
McInnes & LeCras	....	10	10	....	10	100	....	....	....
Ontario	Phelan	13,391	11,833	556	12,389	92	236	333	4
Reserve	Phelan	....	....	116	116	....	653	311	....
Schooner Pond	....	....	465	1,200	1,665	....	497	21	....
South Head	....	363	281	97	378	104	11	54	18
Sydney Mines	Main	109,098	85,591	2,496	88,087	80	16,731	5,873	20
Victoria	Ross	14,262	9,561	527	10,088	70	2,860	1,620	31
INVERNESS COUNTY.									
Broad Cove	....	706	216	2	218	31	....	....	....
Port Hood	....	366	246	....	246	67	160	22	49
VICTORIA COUNTY.									
New Campbellton	....	2,527	1,387	....	1,387	54	414	244	25
		757,496	577,910	109,155	687,065	90	69,960	28,881	13

Statement of the number and classes of persons employed, and average results at each Colliery, during the year ended Dec. 31st, 1877.

Collieries.	Underground.				Surface.				Construction.		Total.		Average No. of days per person.		Average No. of tons per Cutter.	Average tons per day, per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers	Boys.	Days Labor.	Mechanics.	Laborers	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Days Labor.	Under-ground.	Surface.				Above.	Below.	Days.
Cumberland	15	3	4	449	2	5	1	736	6	409	36	1,594	3	49	95	1.5	23	1	....	61
Joggins	32	3	13	8,549	8	7	3	4,394	2	155	68	13,098	178	244	319	1.9	61	3	5	168
Scotia	4	1	....	1,041	1	2	1	476	....	....	9	1,517	208	119	303	1.4	....	....	....	....
Spring Hill	113	39	30	50,302	19	47	7	20,919	11	1,527	266	72,748	276	286	828	2.8	320	4	9	289
Acadia	87	20	17	27,580	22	43	2	19,642	....	....	191	47,222	218	293	725	3.5	309	15	4	204
Albion Mines	209	36	65	66,311	34	104	29	49,569	....	....	477	115,880	214	297	550	3.8	{ Ds 306 } { Ms 451 }	17	27	{ Ds 68 } { Ms 211 }
Intercolonial	61	26	21	21,408	25	34	5	18,052	3	470	175	39,930	198	282	948	5.5	336	7	4	172
Nova Scotia	33	12	10	15,824	7	13	5	7,172	....	....	80	22,996	288	287	818	3.1	104	3	2	259
Vale	96	18	8	22,889	24	42	4	14,151	....	....	192	37,040	187	202	442	3.5	337	2	6	126
Block-house	72	9	35	22,893	21	21	2	10,785	26	4,068	186	37,746	197	245	860	5.9	430	7	27	144
Caledonia	47	3	8	10,785	11	19	3	6,357	....	....	91	17,142	186	192	557	3.3	158	5	8	165
Collins	19	6	7	6,667	....	13	3	4,866	3	936	51	12,469	208	304	407	2.2	41	2	2	189
Emery	....	1	1	713	3	3	1	1,975	8	124	17	2,812	356	281	....	....	....	1	....	....
Gardener	52	2	10	1,850	5	10	1	1,596	....	....	80	3,446	29	100	68	1.6	84	1	....	42
Glace Bay	71	5	14	15,185	22	12	7	10.189	29	3,564	160	28,938	168	248	511	2.8	199	8	7	182
Gowrie	62	7	22	12,542	11	23	3	7,772	1	10	139	20,324	138	165	454	3.8	238	6	18	118
International	32	10	10	8,977	21	12	15	7,753	8	608	98	17,388	173	204	573	5.8	189	8	10	97
Lingan	47	4	14	10,168	....	25	9	8,897	3	761	102	19,826	156	262	448	3.6	169	6	10	124
Ontario	28	7	2	7,134	6	31	3	6,376	....	....	77	13,510	192	156	478	1.8	51	3	2	264
Reserve	....	2	1	502	2	4	1	1,490	....	....	10	1,992	167	248	....	....	....	5	....	....
Schooner Pond	....	....	....	....	3	4	2	806	....	....	9	806	....	89	....	....	....	2	....	....
South Head	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sydney Mines	185	31	55	53,885	60	90	6	48,816	51	13,053	508	115,754	199	262	589	2.4	443	18	30	246
Victoria	32	21	8	9,007	10	20	35	6,151	6	535	102	15,693	147	176	445	3.8	124	1	2	115
Broad Cove	6	....	....	965	1	4	1	80	6	503	18	1,548	161	13	118	....	....	1	2	....
Port Hood	2	....	....	110	2	....	....	110	....	....	4	220	55	55	183	3.4	7	....	....	54
New Campbellton	13	4	3	3,549	4	7	3	2,010	....	....	34	5,559	177	143	194	1.1	14	3	....	181
	1,318	270	358	379,285	324	595	152	261,140	163	26,723	3,180	667,148	195	244	575	3.7	219	129	175	156

COLLIERY CONSTRUCTION ACCOUNT.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery	Colliery Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospect'g	Total.
CUMBERLAND CO.											
Cumberland	$	$ 739.20	$ 200.00	$ 40.00	$	$	80 00	$	$	$	$ 1,059.20
Joggins					360 00		479.50				839.50
Spring Hill				3,500.00	4,310.00		480.00			813.94	9,103.94
PICTOU CO.											
Acadia				82.70	9.15		8.00	1,544.78			1,644.63
Albion Mines				385.31	30,75	100.00		193.72			709.78
Intercolonial		545 79		112.81	210,93		48.50	522.85			1,440.88
Nova Scotia								324.00		40.00	364.00
Vale										1,415.00	1,415.00
CAPE BRETON CO.											
Block house									8,000.00		8,000.00
Collins											
Emery				106.30			34.00				140.30
Glace Bay											
Gowrie		450.00	520.00								970.00
International				1,176.95	745.15						1,922.10
Lingan			68.00	564 20		214.00					846.20
McInnes & LeCras	40.00									100.00	140.00
Ontario		1,287.48	723.00	123.42	60,40	290.00	47.80	268.55			2,800 65
Sydney Mines	9,136.52			6 26	144,48		121.60	400 20	2,750.06		12,559.12
Victoria									550.00		550.00
INVERNESS CO.											
Broad Cove			1,523.01	749.48	70.00		56.48	302.00	357.74	52.30	3,111.01
Port Hood			1,500.00	2,000 00							3,500.00
VICTORIA CO.			2,296.00					50.00			2,346.00
	$ 9,176.52	$ 3,022.47	$ 6,830.01	$ 8,847.43	$ 5,940.86	$ 604.00	$ 1,355.88	$ 3,606.10	$ 11,657 80	$ 2,421.24	$ 53,462.31

INTERCOLONIAL RAILWAY.

Statement of Coals received at the several Stations from Mines in Nova Scotia, for the year ended 31st December, 1877.

STATIONS.	Quantity Tons.	STATIONS.	Quantity Tons.
Halifax	13,736	O'Brien's	24
Three Mile House	150	Nappan	34
Four Mile House	20	Amherst	1,128
Moir's	10	Aulac	36
Bedford	50	Sackville	814
Rocky Lake	10	Dorchester	22,312
Windsor Junction	4,644	Crowsens	24
Oakfield	20	Memramcook	138
Enfield	146	Shediac	148
Malcolms	346	Moncton	842
Elmsdale	58	Boundary Creek	6
Milford	30	Salisbury	1,440
Shubenacadie	346	Petticodiac	228
Stewiacke	152	Anagance	6
Brookfield	52	Penobsquis	24
Truro	4,088	Sussex	384
Valley	10	Apohaqui	30
Riversdale	6	Norton	42
West River	16	Passekeag	22
Hopewell	174	Hampton	508
Battery Hill	6	Nauweigaweik	6
Glengarry	10	Wathers	6
New Glasgow	2,500	Rothesay	196
Pictou Landing	78,186	Torryburn	10
Debert	62	Cord Brook	2,598
Londonderry	10,262	St. John	4,016
Wentworth	24	Chatham	66
Greenville	20	Miramichi	112
Thomson	18	Bathurst	72
Oxford	322	Campbellton	56
River Phillip	6	Charlo	18
Salt Springs	10	New Mills	6
Athol	18		
Maccan	24	Total	150,884

MISCELLANEOUS NOTES.

PORT OF HALIFAX.

IMPORTS.—COAL.

	1876.	1877.
Anthracite from United States.............	6,439	6,534
Bituminous from Nova Scotia ports	123,420	71,310
" " Great Britain	2,635	1,396

EXPORTS DURING 1877.

	Quantity.	Value.
Coal....................................	703 Tons	$1,851
Copper Ore..............................	15 "	710
Manganese Ore	12 "	383
Iron Ore................................	2 "	5
Other Articles of the Mine...............	......	675

DOMINION OF CANADA.

Quantities and Values of Coals Imported and Exported during the fiscal year ended 30th June, 1877.

Countries.	Imported.		Exported.	
	Quantity. Tons.	Value.	Quantity. Tons.	Value.
Great Britain	189,965	$ 484,699	....	....
United States	789,697	3,176,154	184,169	$ 706,946
St. Pierre	30	75	3,675	10,313
Newfoundland	....	....	47,321	109,109
British West Indies	....	....	2,295	4,821
Spanish "	....	....	13,666	25,998
French "	....	....	1,412	3,969
Mexico	....	....	2,240	11,750
South America	....	....	155	325
Total...........	979,692	$ 3,660,928	254,933	$ 873,251

Of the Exports Nova Scotia shipped 147,983 tons.

IMPORTED COALS, 1876-77.

	Anthracite.	Bituminous.	Other.
From Great Britain......	4,111 Tons.	160,175 Tons.	25,679 Tons.
United States......	415,869 "	353,795 "	20,033 "
St. Pierre	30 "	......	......
Total......	420,010	513,970	45,712

INTERCOLONIAL RAILWAY.—1877.

COAL forwarded from—

Acadia Mines....	66,058 Tons.
Albion "	11,510 "
Drummond "	4,344 "
Vale "	32,050 "
Spring Hill "	36,922 "
Total....	150,884

COKE from Albion Mines to—

Londonderry........	11,014 Tons.
Halifax............	60 "
Truro..............	90 "
Memramcook	6 "
Total....	11,170

COAL AND COKE RECEIPTS FOR RAILWAY USE.

	Albion Mines.	Vale Mines.	Spring Hill Mines.
Round, Tons............	28,822	50	49,659
Small "	823	30	163
Coke "	85	..	....
Total....	29,730	80	49,822

GOLD.

General Statement for the year 1877.

Shewing the number of Mines at work, days labour performed, quantities of Quartz, &c., crushed, yield of Gold, &c., &c., for the twelve months ended December 31st.

Districts.	Number of Mines.	Days Labour.	Mills Employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at $18.00 per oz.
							oz.	dwt.	gr.	oz.	dwt.	gr.	oz.	dwt.	gr.	
Caribou	5	14,579	2	2	....	1,735	1	9	21	42	17	....	2,596	13	23	$3.20
Gay's River............	2	3,151	1	1	....	859	....	5	20	....	14	22	251	3	15	1.39
Montagu	2	1,404	1	1	....	55	....	18	5	1	7	....	50	1	9	0.64
Oldham.................	8	14,144	2	....	2	2,015	1	5	2	17	14	12	2,527	19	13	3.21
Renfrew	1	3,543	1	....	1	294	....	14	3	1	3	14	207	13	4	1.05
Sherbrooke	13	47,725	5	2	3	8,654	....	19	1	3	16	16	8,237	3	10	3.10
Stormont	1	3,310	....	....	....	96	2	10	4	4	....	....	240	19	....	1.30
Tangier	2	5,102	2	....	2	364	1	2	13	3	8	9	410	14	15	1.42
Uniacke	4	7,252	2	2	....	470	1	8	6	4	19	9	663	15	9	1.64
Waverley...............	4	14,261	2	1	1	1,422	....	12	4	2	11	20	866	18	10	1.09
Wine Harbor............	3	5,772	2	1	1	1,068	....	10	21	2	4	12	580	14	3	1.80
Unproclaimed, &c......	2	3,322	3	....	3	337	....	14	15	2	9	19	248	9	10	1.34
	47	123,565	23	10	13	17,369	....	19	10	42	17	....	16,882	6	1	$2.46

1877.
MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

	Caribou.							Gay's River.							Montagu.						
	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.
January	4	1,029	40	26	14	7	..	2	572	22	250	*62	9	7	1	119	5	14	5	4	4
February.......	4	1,176	170	170	404	3	13	2	367	14	180	22	..	..	2	65	3	6	1	18	..
March.........	4	905	35	70	124	10	..	2	101	4	....	....	..	..	1	115	7	3	2	19	9
April..........	5	1,447	55	176	475	3	9	1	108	4	36	8	14	..	..	......	....	....	....	..	..
May...........	6	1,669	64	125	373	14	8	2	189	7	37	10	19	..	3	145	6	11	2	16	..
June..........	6	1,365	52	124	131	12	10	2	292	11	5	1	9	..	2	51	2	13	9	19	4
July..........	7	1,084	37	153	217	16	19	2	160	6	80	26	8	..	2	62	2	4	....	13	12
August.........	6	1,583	57	158	213	0	9	2	248	9	75	*25	9	..	2	123	5	....	†	14	..
September......	5	1,486	54	279	207	1	4	2	220	8	40	18	19	..	1	95	4	....	....	..	..
October.......	5	1,267	49	210	159	10	18	2	404	15	47	16	18	11	2	105	4	6	6	8	15
November.....	4	939	36	138	124	9	4	2	282	18	61	22	..	18	4	267	3	3	11	11	19
December.....	4	629	24	106	151	5	1	2	208	8	48	35	17	3	3	257	3	5	7	16	18
	5	14,579	....	1735	2596	13	23	2	3,151	....	859	251	3	15	2	1,404	....	55	50	1	9

* 21.13.1 from copper plates.
3.13.0 " " "

† 0.14.0 from boulders.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

	Oldham.							Renfrew.							Sherbrooke.						
	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.
January......	13	1,489	57	231	206	16	9	1	20	1	....	....	..	..	8	3,861	149	760	652	6	..
February......	12	1,153	44	109	155	2	11	1	233	9	....	....	..	..	8	3,312	138	597	553	12	..
March.........	13	1,384	53	285	177	11	10	1	139	5	20	13	8	20	9	3,752	144	890	766	2	..
April.........	14	1,169	45	189	268	2	3	2	361	14	25	23	16	16	11	3,700	142	705	1050	18	15
May.........	11	1,473	57	229	266	15	5	2	542	21	....	....	..	..	11	3,780	145	678	882	..	..
June.........	14	1,920	74	224	556	5	22	2	525	20	70	40	7	5	12	3,640	149	589	668	13	13
July.........	2	714	27	260	329	1	11	1	399	15	7	7	2	20	14	3,718	143	720	536	6	12
August........	3	917	35	219	343	19	16	1	73	3	5	5	17	3	14	4,320	166	709	548	8	..
September....	3	812	31	37	14	19	19	2	235	9	41	16	2	12	16	4,870	176	775	644	3	17
October......	5	1'132	43	160	172	7	1	2	385	15	20	10	16	..	18	4,752	183	737	640	18	..
November....	3	968	37	25	14	4	..	3	395	15	65	54	15	..	16	4,160	160	866	750	16	..
December.....	3	1,013	39	47	22	14	2	1	236	9	41	35	7	..	15	4,160	160	664	542	19	1
	8	14,144	....	2015	2527	19	13	1	3,543	....	294	207	13	4	13	47,725	....	8654	8237	3	10

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(*Continued.*)

	Stormont.							Tangier.							Uniacke.						
	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.
January......	1	320	12	....	....	..	..	2	379	14	....	....	..	..	5	936	36	50	37	8	20
February......	1	280	11	....	....	..	..	2	425	16	24	53	15	..	4	588	23	26	36	16	16
March.........	1	309	12	....	....	..	..	3	497	19	30	11	10	..	4	644	25	32	34	19	17
April.........	1	380	15	....	....	..	..	2	355	14	40	14	14	..	3	388	15	26	24	18	..
May..........	1	272	10	35	141	6	..	2	309	12	20	72	6	..	3	186	7	26	22	19	..
June..........	1	259	10	....	....	..	..	3	367	14	15	12	7	..	3	426	16	34	33	4	..
July..........	1	280	11	....	....	..	..	2	297	11	30	102	11	15	3	430	16	46	64	17	..
August.........	1	280	11	....	....	..	..	2	378	14	....	....	..	..	3	450	17	31	33	5	..
September....	1	281	11	25	54	10	..	2	412	16	50	43	9	..	3	450	17	40	81	4	..
October......	1	216	8	....	....	..	..	2	447	17	72	47	9	..	4	815	31	35	87	17	21
November....	1	216	8	....	....	..	..	2	455	17	8	1	18	..	4	1,120	43	65	126	2	9
December.....	1	217	8	36	45	3	..	6	781	30	75	50	15	..	4	819	32	59	80	2	22
	1	3,310	....	96	240	19	..	2	5,102	....	364	410	14	15	4	7,252	....	470	663	15	9

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

	Waverley.							Wine Harbor.							Unproclaimed, &c.						
	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.	No. of Mines.	Days Labor.	Men.	Tons.	Ozs.	Dwts.	Grs.
January......	4	1,796	69	92	62	2	..	4	958	73	73	15	11	..	2	297	11	3	4	14	..
February......	3	1,534	59	87	73	..	..	4	866	33	155	123	3	15	2	232	9	34	35	18	10
March.........	5	2,171	83	253	151	3	..	4	652	25	103	103	14	..	3	200	8	21	13	8	..
April..........	4	991	38	63	26	14	..	4	464	18	113	66	16	..	5	775	29	39	22	0	18
May..........	4	1,435	55	138	57	8	..	4	608	23	120	56	3	..	4	411	16	114	83	4	2
June..........	3	1,463	56	149	41	7	..	5	628	24	176	75	7	..	4	434	17	95	68	10	18
July..........	2	782	30	96	136	..	..	4	591	23	84	54	16	..	2	220	8	27	6	9	15
August.........	3	706	27	84	50	19	..	2	97	4	49	19	18	..	1	36	1	6	4	2	..
September.....	5	852	33	160	103	3	..	4	246	9	59	22	17	..	2	75	3	....	....	..	..
October.......	4	702	27	40	14	12	..	3	471	18	98	28	5	12	1	102	....	....	....	..	..
November.....	6	886	34	160	103	1	..	2	142	5	38	14	3	..	1	163	6	....	....	..	..
December.....	5	943	36	100	47	9	10	1	49	2	....	....	..	..	1	277	7	8	10	1	19
	4	14,261	....	1422	866	18	10	3	5,772	....	1068	580	14	3	2	3,322	....	337	248	9	10

FINANCIAL STATEMENT.—GOLD.

Mines Department, for 12 months, ended December 31st, 1877.

	RECEIPTS.			EXPENDITURE.				
DISTRICTS.	Rents.	Royalty.	Totals.	Return of Rents.	Royalty Commission.	Salaries and Surveys.	Lands.	Totals.
Caribou	$ 274 00	$ 990 87	$ 1,264 87	$	$ 24 07	$ 33 50	$......	$ 57 57
Gay's River	16 00	89 58	105 58		3 99			3 99
Lawrencetown	10 00	69 14	79 14		3 74			3 74
Montagu	34 00	16 76	50 76		0 77	11 00		11 77
Oldham	96 00	989 24	1,085 24	4 00	54 16	121 74		179 90
Ovens	8 00		8 00					
Renfrew	54 00	74 46	128 46	12 00	1 94	40 32		54 26
Sherbrooke	278 00	3,061 49	3,339 49		152 68	730 80	423 00	1,306 48
Stormont	48 00	0 79	48 79			220 00		220 00
Tangier	42 00	145 27	187 27		5 80			5 80
Uniacke	122 00	228 49	350 49		4 72			4 72
Unproclaimed	106 00		106 00	6 00				6 00
Waverley		323 62	323 62		18 61			18 61
Wine Harbour	16 00	285 92	301 92		14 08	366 00		380 08
Prospecting Licences			929 76					Re. 8 75
	$ 1,104 00	$ 6,275 63	$ 8,309 39	$22 00	$ 284 56	$ 1,523 36	$ 423 00	$ 2,261 67

OTHER THAN GOLD.

Mines Department for 12 months, ended December 31st, 1877.

COUNTIES.	RECEIPTS.				EXPENDITURE.	
	Licences to Search.	Licences to Work.	Royalty.	Totals.	Return Licences to Search.	Totals.
Annapolis	20 00	....	....	20 00	....	....
Antigonish	220 00	125 00	....	345 00	....	....
Cape Breton	360 00	375 00	35,827 13	36,562 13	....	....
Colchester	100 00	....	....	100 00	....	....
Cumberland	540 00	75 00	7,920 41	8,535 41	20 00	20 00
Guysboro	140 00	....	* 15 87	155 87	....	....
Hants	40 00	....	....	40 00	20 00	20 00
Inverness	180 00	100 00	....	280 00	....	....
Pictou	120 00	100 00	22,405 70	22,625 70	....	....
Victoria	80 00	....	258 25	338 25	....	....
	$ 1,800 00	775 00	66,427 36	$ 69,002 36	$ 40 00	$ 40 00

*Royalty on lead.

ABSTRACT ACCOUNT.

RECEIPTS and EXPENDITURE for the Twelve Months, ended December 31st 1877.

RECEIPTS.

Licences to Search,	Coal..........	$ 1,800 00	
" " Work,	"	775 00	
Royalty,	"	66,427 36	
			$69,002 36
Rents,	Gold..........	1,104 00	
Royalty,	"	6,275 63	
Prospecting Licences,	"	929 76	
			8,309 39
		$77,311 75	$77,311 75

EXPENDITURE.

Return Licences to Search,	Coal....	$ 40 00	
			$ 40 00
Return Rents,	Gold....	22 00	
" Prospecting Licences,	"	8 75	
Royalty Commission,	"	284 56	
Salaries and Surveys,	"	1,523 36	
Lands,	"	423 00	
			2,261 67
General Expenses..................		5,668 31	
Postage...........................		84 98	
Stationery and Printing...........		100 98	5,854 27
		$8,155 94	$8,155 94

REPORT

OF THE

DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1878.

HALIFAX, N. S.:
ROBERT T. MURRAY, QUEEN'S PRINTER,
1879.

CONTENTS.

ERRATA.

Page	7,	last line,	for "Greenfield" read Greenville.
"	8,	5th "	insert "then" after the depression and.
"	9,	11th "	for "also" read only.
"	9,	26th "	for "members" read numbers.
"	11,	18th "	period after "trade," and continne sentence after "Province" (19th line) into 20th line.
"	12,	10th "	for "slow" read slowly.
"	12,	15th "	for "was" read were.
"	12,	37th "	read the average was only 240 tons.
"	14,	23rd "	for "the" read this.
"	17,	30th "	for "full" read fall.
"	17,	36th "	read question.
"	19,	17th "	for "log wharf" read long.
"	19,	33rd "	for "drops" read dips.
"	22,	4th "	for "laminœ" read laminæ.
"	23,	20th "	read, "It does appear, however."
"	24,	1st "	read scaffolds.
"	24,	19th "	for "off-shots" read off-shoots.
"	26,	7th "	for "place" read plane.
"	26,	26th "	for "marked" read worked.
"	26,	49th "	insert "In the Report of 1874" the accompanying plan of workings.
"	27,	38th "	for "when" read where.
"	27,	40th "	for "striœ" read striæ.
"	29,	11th "	read Touquoy.
"	30,	14th "	for "fender" read feeder.
"	31,	8th "	for "bulk" read hulk.
"	31,	9th "	for "holding" read holeing.
"	33,	14th "	read 20 fathom level to.
"	36,	41st "	read a place *not* daily examined.
"	39,	33rd "	read test 150 lbs.
"	40,	3rd "	for "scales" read scale.
"	40,	14th "	for "the end" read the ends.
"	42,	25th "	read the *rent* between the rivets *was*.
"	43,	last "	read caught by the coal.
"	44,	5th "	for "badly" read baldly.

DEPARTMENT OF MINES.

REPORT

FOR THE YEAR 1878.

To His Honor the Honorable ADAMS GEORGE ARCHIBALD, *C. M. G., Lieut.-Governor of the Province of Nova Scotia, &c., &c., &c.*

MAY IT PLEASE YOUR HONOR :—

The undersigned herewith begs to present to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1878.

SAML. CREELMAN.
Commissioner of Public Works and Mines.

Halifax, January 27th, 1879.

REPORT

ON THE

INSPECTION OF MINES IN NOVA SCOTIA,

For the Year ending 31st December, 1878.

By HENRY S. POOLE, F. G. S., Associate of the Royal School of Mines, &c.

Halifax, December 31st, 1878.

Sir,—In submitting a report on the mining operations in this Province during the current year, I am unable at this season to write of the extent to which the several branches of the Mining Industry have been conducted; for the Returns on which accurate statements can alone be made are not obtainable until the 1st of February next.

I have hence the honor merely of touching on, in a general way, some of the subjects and matters which hitherto I have ventured to treat of in detail. The appended statistical tables I presume will give as usual the pith of the information collected, at least on the two chief branches of the Mining Industry, Coal and Gold. The other most important branch, the Iron, has been conducted with increased energy by the Steel Company of Canada at Londonderry. One furnace has been steadily kept in blast, and in the mill a quality of bar iron produced which compares favorably with the best brands of imported iron.

The prospecting for Lead resulted unfavourably at Caledonia, the vein becoming even smaller and poorer under the river, and the rock so wet as to compel the abandonment of operations. Nor was the search at Pembrooke for lead more successful.

Copper mining remains at a stand still, though the discoveries at Polson's Lake ultimately warrant a hope that before long Copper mining in Nova Scotia will be regularly established.

The usual quarries of gypsum, freestone &c., have been worked and have produced about the usual average quantity. Barytes on a small scale has been mined at Greenfield on the I. C. R.

THE COAL TRADE.

Although the depressed condition of our Coal Trade has been a matter of some political discussion and has thus become somewhat hackneyed, it may not be altogether irrelevant to consider it once more and from another stand point, the miners, and review first the cause of the depression and the means proposed to ameliorate the condition of the trade.

In 1850 our foreign exports of coal were chiefly to the United States and were about half of the total quantity marketed. During the four years previous to the reciprocity treaty, the amount sent to the neighboring Republic was about 100,000 tons a year. During the six years immediately subsequent to the making of that treaty the increase averaged 30 per cent. on that quantity. But by the end of the ten years that the treaty lasted the exports had increased 385 per cent. and in the last year of the treaty, 1865, no less than 73 per cent. of the total sales of coal went to the United States.

Previous to the treaty the import duty had been 24 per cent. ad-valorem, subsequent to the treaty it was made specific, $1.25 per ton. The increase of the trade during 1854—1865 was due not alone to the treaty but also to the new agreement entered into, in 1858, between the Provincial Government and the holders of the Duke of York's lease, the General Mining Association; which agreement enabled new collieries to profit by the treaty and supply additional quantities of gas coal then in demand. The lapsing of a treaty and imposition of a duty seriously effecting a large proportion of the total sales laid the foundation of the present trouble; while the momentum given to the trade continued it, though with lessening force for a time in its old channels. Similarly the momentum given to the development of the coal industry by the provincial agreement with the General Mining Association still continued to open new collieries, though also in a lessening degree. Together, competition was aggravated and was becoming severely felt when the abnormal condition of trade in 1872–3 gave temporary relief. Then followed that sudden decline which makes the present state of the industry all the harder to bear.

With the decline of our exports after 1865, to New England, the trade we held passed into the hands of native producers of coal who competing among themselves have in their turn cheapened the cost to consumers. And then our additional collieries, able to do more than supply the active demand at home, had to seek new markets and suffer from increased competition. Great Britain and the United States were alike affected by the wave of financial depression, and the coal dealers of those countries also sought relief in exportation. Nova Scotia struggled for a portion of the trade with the West Indies and South America, as was noticed in previous reports, but was over-

powered by her powerful competitors controlling return freights. As shipping also suffered with other industries, the decline left less difference over ocean freights in our favour to markets near at hand. English coal again competed with us in New England and deprived us of much of the vantage ground gained in ports on the St. Lawrence. At home competition became keen for the provincial consumption, now nearly one third of the present production.

At the time when the whole coal business was in the hands of the General Mining Association, the production was regulated by the demand, and the trade not being forced prices were maintained. The rates to consumers were also affected by freights. Since 1873 freights have continued to decline and now coal is sold to consumers at rates never before known.

Comparing the trade returns for a number of years a permanent though fluctuating progression is noticeable, each decade roughly speaking, doubling the output of coal. The annual sales of the present time are more than double what they were in 1858 when the trade was opened to competition. This year's output has exceeded that of the often-styled prosperous year of 1865 and though it has so and also that of the preceding year, it is regarded as most unsatisfactory, and naturally so for it has not been remunerative.

But then no more has coal mining generally been of late in England and the United States. Every one is familiar with the accounts of the extreme destitution and desolation of districts of South Wales but lately prosperous and thriving; and in the anthracite regions of Pennsylvania of the collapse of many companies, of the large sacrifices of members to keep their works in operation, and of the hardships endured by workmen forced to accept short time and starvation rates of wages. It is sufficient to call such circumstances to mind and to remember the conditions of those engaged in the trade abroad, to cause some feelings of resignation that trying as the times may be for us they are no worse than with our neighbors. But such feelings should not lead to apathy or occasion means for improvement to be left unconsidered and untried. Nor have they altogether, the coal owners have been solicitous to improve the condition of the trade. They have considered with politicians the prospects of restraining foreign importations, of fostering exportation by bounties, of encouraging home manufactories consuming coal, and of readjusting the tariff to favour mining and reduce the cost of material.

Besides the assistance to be had from government they have also open to their consideration a combination among themselves regulating the output proportionate to the demands of trade; and then there is the ever present question of economy in production.

The first of these considerations was discussed when the matter came up in 1875 and need not be again touched on; the latter is the constant aim of Mining Engineers and the several steps taken of late years have been duly noticed in these annual reports.

The question of the hour then with the coal miner is, how far ought a government to go in the way of fostering his trade. An industry that relies on an acquired reputation in addition to the excellence of the quality of its product is recognised as more difficult to

establish than one requiring only skill in its management. Is coal of this class and shall it be protected? Some coal owners say it should.

Before considering the bearing of the several proposed means of relief, it may be well to premise, that there are now mines open which are able to do more than supply the home demand and the available export trade; that such a condition is natural to every industry which is not a monopoly; and that unless affected by some violent fluctuation in every trade competitors are engaged in a struggle in which some are losers while success attends those who are favoured by natural advantages, those who can command a preferred article, those who can work cheaper, transmit to market cheaper, or command cheap labor through constant employment.

The facilities opened shortly before 1866 for mining and the circumstances then favourable for making the business profitable, drew capital into the country, capital which was not always judiciously expended, nor in directions that the trade warranted. And even after the limits of the demand were reached, new schemes were 'promoted' which added to the keenness of the competition while the capital lasted. They largely aided in making the present times harder to bear. Those familiar with the industry will bear me out when I say, that by the opening of mines unwarranted by the condition of trade, prices of labor were unduly advanced, men left their avocations to become miners, farmers let their land run to waste to work underground. Subsequently they returned to their deteriorated farms with empty pockets if not in debt. Better wages led to extravagant living and the contraction of debts, people with a little means put into businesses which apparently flourished when times were good, but when the tide turned left them poorer than before. The money that was expended passed through the country and affected no permanent good. Such waste seems inevitable in times of excitement and in the development of new industries. It may be expected to re-occur and complete another cycle in due time.

The coal-master in looking for government assistance has had it suggested, 1st—that the royalty might be remitted; the claim to regard a royalty on coal as a special tax was discussed fully in my report for 1876, and it was shown that by its remission the *Local* Government would gain no equivalent return though the output should thereby be increased. It might also be shown that when the productive ability of the mines is in excess of the home demand, prices will be largely regulated by foreign competition for the surplus, and that no change in the royalties will affect, with perhaps an exception or two, the profits on the home sales. A reduction would, in the main, go to the local consumer. It would, however, favor the exporter. 2nd.—That a tax on imported coal would check foreign competition within the limits of the tax favoring freights;—provided the relative value of the articles competing was the same.

But the conditions involved in the direct and indirect advantages to the trade and in the gain and loss to the country at large by such a tax are so many, and the whole question is so involved that I shall not attempt to classify and consider them. It might, however, fairly be asked whether a tax which checked importations from Great Britain would not so raise the rate of freight up the St. Lawrence as to

practically defeat the end in view, and increase the homeward freights on grain and lumber. It is also questionable whether a tax would stop the importation of hard coal which we cannot supply. It is certain that by it the exports would not directly be increased, and it is also certain that with it the Western consumer of coal must pay it or go back to the use of wood.

3rd.—That a bounty equal to the United States duty would put us on an equal footing in New England with the coal producers of Pennsylvania and Virginia, and discriminate in our favor against English coal; which of late, to the amount of 30,000 to 40,000 tons, has again been imported into Boston and sold at $3.50 per ton: freight being as low as 70 cents per ton. It has even been sold as low as $3 a ton in New York.

If the business of coal mining is to be fostered, a bounty is said to have this advantage over a tax: It would not bear unequally on different parts of Canada, nor interfere with the export trade of the St. Lawrence; while it would increase the exportations, and benefit the failing West India trade, while contemplating the several means open for winning the trade of the Upper Provinces.

There is another means of carriage which perhaps has hardly been fully considered: It is by rail. The course of trade is such that some 4,000 cars go west over the Intercolonial Railway empty, and freights going east are so encouraged that car loads of 100 barrels of flour are brought from Toronto for $60 and $65. It has even been stated that flour has been brought to Halifax from Chicago for $55 per car. Now the railway moves from Toronto to Halifax for the sum of say $60, flour weighing 10 tons, a car weighing also 10 tons, and also such cars as return empty 10 tons back, in all 30 tons; or in other words a weight of 10 tons is conveyed for $20. Presuming that it pays to bring flour down for $60 a car, and take the car back empty, it seems reasonable to suppose that a car load ought in preference to be carried back for $20, plus a small percentage for detention and wear and tear, rather than an empty car, which actually costs, according to published average expenses, $6, when taken a distance equal to that from Halifax to Toronto.

Coal in bulk could not well be sent in cars as at present constructed for carrying ordinary freight; but were it bagged as invariably is done in London for delivery, why should it not be carried say from Spring Hill, at $2 per short ton. The total cost then at Toronto would be:—

Coal	$1.70
Freight, say	2.10
Bags	.50
Total	$4.30 per 2000 lbs.

But as coal from the United States has lately been sold in Toronto at 3-35 per short ton, a protective duty of $1 a ton would be required to give command of the trade in this way.

Outside of Government assistance there remains for the coal owners to practice economy and to work combinedly. In ordinary trade competition the latter cannot be effected, but the practice of economy is always open to the colliery manager; although in the conflicting evidence given before the coal committee in 1876, my previous remarks on this question were bluntly denied. To some people the word "can't" comes as a ready excuse, though others may hesitate to use so positive a word.

The possible changes of the future need not be here considered, for alterations in system come slow in a country where the business is limited and competition not invariably keen.

In Cape Breton to-day the economies, perforce in many cases practised bear hardly on the coal miner; but what is most felt is the want of steady work. While actually at work, the cost of all labor and material per ton is as low as 63 cents in one case, and not much more in some others. Was the demand only constant and uniform, coal could be mined in Cape Breton and a good profit made at present prices; the irregularity of the trade and idle winters for the present debarring, in most cases, any such happy result.

The question has come up, how far does the mining of a ton of coal benefit the country? Immigration statisticians compute that every able-bodied man who comes into a country is equal to a capital of $1000, or $60 a year. To reduce that amount to a rate per ton it is necessary to find out how many tons a man will cut in a year, and how many men are required to handle afterwards what he cuts. Our Mining Records show that last year our colliers averaged 3·7 tons a day, or at the rate of 1100 tons a year, were work constantly supplied. But the actual rate was only half that amount. To every two cutters there are required three men for other purposes about a colliery, so that 440 tons is the quantity mined per person employed, when work is steady; but last year only half that amount was won. Then on the above computed value, each ton of coal mined is worth to the country at full time, only $1.36.

If we take the result of the best annual average in Nova Scotia, 640 tons per cutter, then each man employed is worth 256 tons, or each ton is worth to the country $·234.

In South Wales the cutter averaged in 1866, about 320 tons per man, but when prices went up in 1871, they only averaged 240 tons per man. At the ordinary yield in South Wales, if each man is considered worth a capital of $1000, each ton mined would be worth to the country $·468. On the other hand if first class workmen were alone considered, then, as they can turn out as much as 100 tons per man per month, the value to the revenue per ton, would be proportionately less.

In making my final comments on this subject, I would express a firm conviction, that violent changes, either increasing or decreasing the output, are much to be deprecated. A sudden relief from the present depression, would effect as much evil as good; it would induce the opening of new collieries and again induce men to rush to the coal mines, even beyond the increased demands, and until a stage of over production, similar to the present, is again reached. Now there is but one colliery to every ten miles of coal fields. Let the

trade be unduly encouraged, and every holder of an unworked lease, will strive to place his property on the market, encouraged in the belief that his coal is the best, "just as every crow thinks its own chick fairest" An honest competition, and a gradually increased demand, if only attainable, are much more desirable for the trade, the country, and the workingman.

COUNTY OF CUMBERLAND.

COLLIERIES.

JOGGINS.—The workings of the present lift have reached their extreme limits on the east level to the heavy fault; and to the west the workings have been stopped on account of the greater thickness of the parting. The advantages of the system adopted, by which almost the whole of the seam is won, has been interfered with by the irregularity of the demand and the reduction of the trade in consequence of the low freights bringing other coals in closer competition in the St. John market.

SCOTIA.—The small quantity of coal that has been sold of late has been taken from the top of the combined seams immediately to the rise of the Chignecto pit, where the section shows some 7½ feet of coal and only 1 foot of fire-clay. Openings have been made by a small slope and an adit. which will prove of service in drawing off surface water from any deeper workings.

SPRING HILL.—Doubt of the existence of two workable seams where one only was previously supposed can no longer be entertained. The faces of what were thought to be approaching levels have now passed one another fully five chains. In order to profit by this fortunate discovery, a stone drift has been driven on the west side of the fault from the lowest level of the overlying or Black Seam to the underlying or South Seam, and the latter was reached at a distance of 175 feet. The coal of the underlying seam was found to be 9 feet 9 inches thick. Levels have been opened in the seam and a heading driven to intersect the workings from the West or Hall slope. From the latter levels have been driven to the east to meet the heading from the new winning; and to the west 22 chains into coal reduced to 3 feet 8 inches.

In the overlying Black Seam the levels going west are to the barrier of the General Mining Association's area, and east they are in 42 chains to a heavy fault which lies N. 15 E. or nearly level course. At the face the seam dips at an angle of 50° and the upper coal is reduced to 3 feet in thickness. The lower portion of the seam, separately worked, also thins to the east.

It has been proved advantageous to remove the pillars as soon as possible after the rooms have been worn out, in order to reduce the weight upon them and get a larger percentage of coal.

The ventilation in the summer did not exceed 11,000 c. ft. per minute, a quantity certainly not superabundant; and means for largely increasing the supply were strongly recommended. As the furnace in its present position is comparatively of little use it is contemplated to erect a fan.

The victim of the first appearance of gas in these pits in the Autumn of last year died of his burns. His death was not reported to the Department of Mines as the law required: nor was a subsequent explosion which injured an old man named Furguson. The alteration of the law at the last session will in future prevent temporary success in hiding an accident from passing unpunished.

The pumping facilities have been increased by the addition of a Blake pump of the following dimensions: cylinder 28·5 inches; plunger 10 inches; stroke 3 feet. To it is attached a Guthrie's Condenser which gives $19\frac{1}{2}$ inches of vacuum, and which besides increasing the power of the pump gives greater smoothness of action and gets rid of the troublesome waste-steam.

The agreement, between the lessees of this colliery and the General Mining Association, to work their areas in common, postpones for the present competition in the field, and is to their mutual advantage and profit.

PICTOU COUNTY.

The limited extent of the workable coals in the field of this county has been in some directions confirmed by workings and recent explorations. To the north west the exploring levels of the Nova Scotia pit found the seam to deteriorate, and to be troubled with faults; on the northern upthrow the levels of the Foord pit proved a high inclination. The south levels also, 9 chains from the area boundary, have got into poor ground, which probably is connected with that struck years ago in the old Stair pit workings, and later in the German's pit, and still later by the bore hole, put down last year by the Diamond Drill for the Acadia Company. It would almost seem, judging from the data furnished from actual operations, that at the time when the Pictou coals were deposited within the lagoon, bounded north by the New Glasgow conglomerate, there was a great river running much as the East River now runs, though perhaps more to the south-east, which brought down much fine sediment, and deteriorated the quality of the coal beds opposite its mouth, while in the other parts of the lagoon the beds less contaminated by sediment formed of purer bituminous matter.

The Diamond Drill has bored a second hole on the Pictou areas to a depth of over 1000 feet, and a third reaching a few feet over 500; which have confirmed the correctness of the sections published by Sir W. Logan, of the western crop of the marsh measures.

The efficiency and economy of the Diamond Drill, under skilful direction, as experienced in the operations from time to time noticed in these reports commend it highly for the purposes of the explorer and for artesian well boring.

Late trials in the coke ovens at Londonderry have shown that the coal from the Intercolonial pits will make a saleable quality of coke.

COLLIERIES.

ACADIA.—Ten years having passed since this colliery was established, many repairs and renewals have been required in all timber structures exposed to the weather. A decade seems the extreme limit of endurance of our ordinary woods in wharves, bridges and open framings. In fact seven years of exposure is often sufficient to seriously impair their strength.

Screens varying from the common type have been put up. They first separate the largest lumps which cannot pass through bars six inches apart, and then the ordinary slack from the remainder. This double screening is most effective. The slack falls into a hopper, whence it is taken by an elevator up into a revolving screen, which thoroughly cleans the larger fragments, or nut coal from the dust and dirt or duff coal.

In the pit the ventilating furnace has been re-built with a lower arch than formerly, the approaches have been protected with brick, and the shallow upcast reduced from the unheard of dimensions, 15 feet square, to 11 feet in diameter. The ventilation has been increased by the changes, but the upcast is much too short to get the best results from a furnace which doubtless before long will be replaced by a fan.

Duff coal is now alone used, as before noticed, under the colliery boilers, and in the ventilating furnace, it is yet to be tried in the company's locomotive engine.

Sinking for a new lift has been begun, since the levels in the 4th have reached the barriers, and the work of removing pillars commenced. In the 4th lift the lowest bench of coal has been left almost intact, and should coal once more become valuable it may yet be worked and after the disturbance due to the taking away of the pillars has had time to subside. In critical situations when a "fall" was desirable to relieve the weight on the pillars, No. 2 dynamite has been used to knock out the props and set the roof working.

ALBION.—In the Deep seam the workings were confined to the winning opened by the stone drifts from the Foord pit; and merely to the fore-winning the coal by the upper and lower sets of north levels. A scale of 15,000 feet of air is now brought down through the Deep seam upper workings to this winning, and hence to the fan, hitherto it has been ventilated by a split from the main north intake. In the Main seam the level faces on both sides are stopped at faults; on the south side, three-quarters of a mile from the pit bottom, and where the seam is reduced to one-third of its thickness and yields only 5 feet of good coal. The deterioration of the seam on the south side at first showed 400 yards back from the face in the upper boards of the

lift, as the workings extended it came down and ultimately crossed the level. Its extent already proved is considerable, and seriously affects the prospective value of that unworked portion of the seam lying to the south-west. The coal directly to the deep is being proved by an incline, and, so far as it has gone, the thickness and quality is found unimpaired. The dip, however, is reduced, and at the face is now only 12°, indicating an approach to the bottom of the basin, which has already been reached on the north side, first, by the level as previously mentioned; and secondly, by a pair of slants, which, after going down at the regular pitch for 150 yards, flattened and continue level so far as yet driven. Strangely enough, a fault came in directly between and in the course of the slants, and so far has confined itself to the intervening pillar. A bore-hole has lately tapped the old north slant workings and drawn off the body of water that lay in them.

On the bank-head scales have been put up in order that the colliers may in future be paid by weight, hitherto they have been paid by the cubic yard cut.

INTERCOLONIAL.—In the new lift, which gives a total length to the slope of 1,710 feet, the levels are being won out. The work is done without powder by mall and wedge, at less rates than in some cases is done with the assistance of powder.

The upper lift still supplies the bulk of the coal marketed, and the pillars yet remain untouched. To connect with the workings on the up-throw side of the first south fault, the expense of a stone drift is avoided by using a back-balance.

The business of this colliery was largely aided by obtaining the contracts to supply both the Steel Company of Canada and the Intercolonial Railway with coal.

NOVA SCOTIA.—In June, mining at this colliery was stopped, the pumps withdrawn, and the water allowed to accumulate. A copy of the pit-plan has been deposited in the Mines Office.

The exploring incline, mentioned in the last report, found the coal good down the barrier side, but in the level that was turned away north, the coal deteriorated 50 yards in and before the heavy fault was reached. Fears being entertained that the good coal to the deep would not repay the heavy expenditure necessary to open below the fault, operations were stopped.

To relieve the intervening barrier from the pressure of the rising water, a bore-hole has been put through from the Acadia side, and the water reduced to a depth of 70 feet.

VALE.—The out-put from this colliery was larger than ever before, and to further increase the facilities, sinking for a new lift was begun. The present workings extend 20 chains to the east and 26 to the west of the slope, and they are ventilated by two splits of 8,000 c. feet each leading to the separate furnaces.

CAPE BRETON.

The coal trade of this County strongly felt the great competition, and prices f. o. b. ranged from $2 less commission down to $1.25 a ton of round coal for contracts. The miners also suffered from scarcity of work; and had it not been that many of them were able on idle days to fish, or to plant potatoes, and to thereby lay in a small store of provisions, they would be poorly off indeed.

COLLIERIES.

SYDNEY.—The explosion of gas that occurred at this colliery in May, was the most disastrous accident that ever happened in Cape Breton. It will be found reported in full under the heading, Accidents.

The new hoisting shaft at Lloyd's Cove has been fitted up for drawing coals, and to the ropes are attached Walker's safety hooks, but the men still ride on the cages retained in the pumping shaft as a second means of egress. Under ground an engine has been placed for haulage, and to it will be added a Davy's Separate Condenser; at present the planes are not in working order.

Great attention is given to the preparation of the coal. The cutters are paid for round coal only, the slack being separated and weighed by means of four Billy-fair-plays. The latest addition has been Potter's Coal-saving Apparatus, placed at the end of the screen, to save breakage. It is a tray working automatically. The weight of a given quantity of coal coming on it from the screen lifts a weight and releases a catch and allows the tray to descend to the bottom of the wagon and discharge itself; counterbalance weights then raise it back into position, and the catch retains it there till again released.

LINGAN.—Mining has chiefly been on the south side, for to the north the coal got thin and the lift approached the crop, the surface falling off in low ground.

The pillars have been largely worked; first, a slice has been taken off, and then they have been driven through every four yards and worked to the full. About 10,000 c. ft. of air circulate through the pit. The zeal that is displayed in getting and keeping this pit in good order, and yet practice economy suitable to the times, is worthy of commendation.

VICTORIA.—After withdrawing the pumps and allowing the water to partly rise in the mine, this colliery was sub-let to the present occupier. The General Mining Association having raised a questiou as to the accuracy of the pit plan, which showed the workings without the barrier, an independant survey was made and confirmed. It disclosed that the plan kept at the mine had the irregular boundary line, high-water mark so incorrectly laid down that the workings on the east side were wholly within the barrier that should have been reserved. How far the error was wilfully made is not clear, but a few years ago, on my objecting to the incompleteness of the plan kept, the present one was presented as the work of a surveyor whom I

supposed competent. The check survey made that of the workings to be tolerably accurate, but the position of the boundary to them to have been falsely placed on the plan.

An explosion of one of the boilers at this colliery elsewhere recounted at some length, places the then management in no enviable light.

COLLINS.—The slope has attained a total depth of 1,438 feet, the last 18 feet being in a stone trouble. Previous to entering it, the slope had passed through a 60 feet trouble only separated by 50 feet of good coal. The troubles do not break the measures, but merely cut the coal; they greatly interfere with the work of extending the workings, and are evidently numerous in that portion of the seam opened. Their general course is 60° to 80° E. of N. The workings on the south side were confined to eight rise-rooms. A small furnace gives some 8,000 c. ft. of air.

RESERVE.—This pit was worked by the local agent to pay current expenses. It has been kept in good working order. Mining was carried on from the 3rd level on the north side, and some 20 pairs of men were at one time employed. Slack was used under the boilers with satisfaction. The Emery pit has been allowed to fill with water.

INTERNATIONAL.—The system of working this pit, described in previous reports, has been advantageously continued; an additional step has been taken in robbing the pillars to the rise of the adit level.

LITTLE GLACE BAY.—To save breakage from rehandling, the coal is run in the pit tubs direct to the wharf. Larger tubs. having a capacity of a ton, are now used. Their dimensions are as follows:—Outside length, 7 feet, 6 inches, width, 3 feet, 6 inches, height, 3 feet, 3 inches, weight, 530 lbs. The inside measurements of the tubs are, length, 6 feet, 7 inches, width, 3 feet, 3 inchees, and height, 22 inches. A change has been made in the winding engine, and it is now geared three to one.

To utilize the locomotive, a third rail has been laid on the railway; and the large cars are no longer used. The headways and levels in the pit are being won out, and an endeavor made to communicate with the rise workings from the Harbor pit. The operations at present are on a small scale, and the ventilation is equally limited.

In summer the heat of the exhaust steam gave about 4000 cubic feet of air per minute.

CALEDONIA.—Equally with most of the outmines, this colliery suffered from the reduced demand and keen competition, and this years' operations have been on a very limited scale. In the pit all coal is wrought in rooms and the extensive pillarage still remains undisturbed. The coal is now weighed from the cutters on a scale on the bank-head.

ONTARIO.—The coal from this pit has been pressed into market most vigorously, and in comparison with others better equipped, this

colliery may be said to have done a fair business during the shipping season. The pit workings remain of the ordinary simple character; the ventilation being somewhat assisted by the opening of a new up-cast on rising ground. The management are fully cognizant of the wisdom of leaving an ample barrier of untouched coal next the sea boundary of the area, and it is proposed to leave a barrier of 300 feet as the denudation of the cliff is known to be rapid.

BLOCKHOUSE.—The large business done by this colliery was in sending gas coal to New York. The coal was taken almost altogether from pillars under dry ground, so that fracture of the surface might be attended with but a small increased discharge of water. The air circulating in the summer was found to be 18,000 c. ft. per minute.

Explorations were made at Long-beach, with a view to sinking on one of the seams of that series in the spring.

GOWRIE.—As at the other establishments opened about the same time, this colliery is put to large expense to renew timber structures. The superstructure of the log wharf requires to be rebuilt.

In the pit all new rooms are broken off double with a track on both sides and the centre stowed with waste, slack and stone. Off the upper west level some 17 rooms were worked; and from the inner incline, 150 yards long, some 16 places more. The foot of the incline turns towards the new pit not yet in working order. Of the 12,000 c. ft. of air that passed over the furnace, one half passed the faces of the upper levels.

GARDENER.—This pit was kept pumped out until May 29th when one of the boilers blew a hole in its shell. The connections being broken, steam was cut off from the steam pumps in the pit and the water was allowed to rise and drown them out.

AT OTHER LOCALITIES.

The pits opened have been worked on a very small scale. In Inverness County, at Chimney Corner the level in the outcrop of the most westwardly seam worked on the point has been driven about 100 feet in addition to the 450 feet previously driven. The length of the ground gives 4 small rooms. The seam is $3\frac{1}{2}$ feet thick and drops at an angle of 40°. A small engine was set up to raise the coal from the level mouth on the wharf.

BROAD COVE.—The workings in the seam are merely a level in some 460 feet, an upper level and an intermediate place. The seam appears dry, with a good roof and favourable for working. The means for shipment are by scows from the river's mouth to vessels at anchor outside. To confine the river and make it available at all times of the tide a race-way has been built. Check-gates were put on it to stop the flow and flush out laden scows at low water.

PORT HOOD.—The destruction of the boilers early in the year prevented mining at this colliery, and they were not replaced until late in the season. The explosion of the boilers will be found elsewhere described

GOLD MINING.

The character of the auriferous rocks of Nova Scotia was a matter of some scientific discussion a few years ago, and it was then suggested that the gold obtained was from " quartz beds of contemporaneous age with the quartzite, and the slate with which they are interstratified." Dr. T. Sterry Hunt reporting on this Province then wrote :—" So far as my present observation goes, I think that to describe the gold lodes otherwise than as interstratified beds would be to give a false notion of their geognostic relations. The laminated structure of many of the lodes, and the intercalation between their layers of thin continuous films or layers of argillite can hardly be explained in any other way than by supposing these lodes to have been formed by successive deposition at what was at the time the surface of the earth."

No general description could better express the character of the leading feature of our gold districts than this; but the theory that the leads (as the lodes are locally called) are contemporary beds with the slates has not been generally accepted, nor has it gained ground with the additional knowledge derived from further working. It has not been adopted by any of the working men, among whom are skilled miners from Europe, Australia and the Pacific Coast of this Continent.

My position having enabled me to see leads in varied stages of exploration, I have kept in mind the opinion in question, and carefully examined the leads in their relation to the containing rocks. The results of my imperfect observations and the opinions I have formed, I now venture to give in the form of a short descriptive paper; beginning with

THE GENERAL GEOLOGY OF THE GOLD FIELDS.

The general features of the districts and the position of the leads in relation to the country rocks may be thus briefly sketched,—Along the whole Atlantic seaboard of Nova Scotia from Scatarie to Cape Sable, paleozoic rocks extend. The lines of stratification have an almost universally east and west course, and are, generally speaking, parallel with the coast line and with the axes of upheaval, not only of the hill ranges, but likewise of the anticlinal folds that bring the leads to the surface. The leads also conform with almost unvarying persistency with the strike of the slates and quartzite beds, following even the plications of the strata with most remarkable regularity, and certainly more strongly suggesting their being contemporary beds rather than intrusive veins.

While quartz veins are not confined to the districts where gold is found in paying quantities, the auriferous rocks are mostly found about the axes of anticlinal folds. The appearance which many of them present may best be compared to a series of diversely shaded

sheets of paper sharply bent together, tilted at one end and cut horizontally. The lines which the sheets of various shades then show would approximately represent the position which the interbedded leads have with the slates and quartzites. And further, as on whichever side the lateral pressure found the least resistance that side would be the more highly inclined, so we find the strata of these anticlinals generally conforming to such an arrangement.

For instance at Sherbrooke and Uniacke the vertical dip is on the south side, and the angle of inclination on the north side is about 45°; in other districts, as Waverly, Refrew, and Moose River, the vertical and inclined dips are reversed. While at Sherbrooke the width of the main street alone intervenes between the workings on the vertical and inclined leads, at Uniacke the north dip is two miles away from the working belt. Then at Renfrew, half a mile to the south of the slightly inclined leads, such as the Preeper, the free-claim leads in the overlying strata have a steep inclination in the same direction.

At Waverley the planing off of the top of the anticlinal fold has not been so thorough as in other fields, and has only been effected in that section where a valley of depression crosses the anticlinal. The top of the anticlinal fold that remains is in Laidlaw's hill, and the strata with the interbedded leads are then seen to fold over without fracture in a line with the axis—that is, in an east and west direction While on the contrary, the elevation of the hill side is assisted by a series of north and south breaks, which raise the strata in steps of an inch or more and up to 20 feet, the smaller faults being on the crown of the hill. In this portion of the district the leads lie so flat that they are worked "longwall," and the gold is chiefly found where the lead is crumpled together by the folding and forms what are called "barrels."

In mining, the foldings have been followed down on both the north and south dips. The courses of these barrels or plications on the crest have been found to be in the direction of the anticlinal fold, and on either side to dip to the north and south, representing, as it were, the resultant of the forces encountered in the upheaval. The folds so sharp in the quartz are succeeded but by moderate undulations in the overlying stratum.

A similar folding of the leads is common in other districts, though not so regular and prominent; elsewhere the barrels are usually denominated rolls, and the angle at which they dip is various and up to 60° from the horizontal. Generally their hanging walls are alone contorted, the foot-walls seldom manifesting evidence of disturbance, though the rule is not universal.

THE GEOLOGICAL AGE

Of the auriferous rocks is supposed to be contemporary with that of the Cambrian, but the horizon of the belts has yet to be defined. It has been suggested that only the lowest of the series contains the gold leads as they are found, brought to the surface by the anticlinal folds. This view has been favorably regarded by those who considered the leads as bedded deposits, but the surveys hitherto made have been too fragmentary to confirm it. It may rather be considered that the

lithological characters of the several districts point to the existence of some three groups of rocks in which auriferous leads are found. The lowest, composed of beds of slate and grits, crumpled and contorted, and cleaved transversely to the laminœ; in these no paying leads have hitherto been found. The middle, of compact beds in which quartzite predominates, and the cleavage planes conform generally to the lines of deposition. Rocks of this group in the neighborhood of anticlinals are intercalated with numerous quartz leads, of which some belts only are auriferous to a profitable extent. The upper group in the extreme western section of the Province, about Yarmouth, consists of olive green fissile slates, associated with beds of micaceous sandstone, and one, at least, plumbaginous bed. Some of the strata are chloritic, and in veins chlorite is common, though a rare mineral in the true gold districts. Mr. Selwyn, Director of the Geological Survey, states that some of the sandstones contain pebbles of grey quartzite, and that he is inclined to believe that these rocks will be found to occupy the position of some division of the Quebec group.

Of the relative age of the gold veins that are associated with the rocks of this section, there is no doubt but that the veins are the newer, for where exposed by the tide at Gegogin and Cranberry Head they are seen to angle across the beds and to swell out into masses six and even eight feet wide, and to pinch within a few feet distant into less than as many inches, to again expand and contract. Such veins are reported to contain a few pennyweights of gold to the ton.

One vein at the Cream-pot, Cranberry Head, while not so irregular as those at Gegogin is still unconformable; when worked it yielded as much as one ounce of gold to the ton of quartz crushed.

In the District of Tangier an exposure on the river side indicates the difference in age between the rocks in this article distinguished as middle and lower gold bearing. There the dark slates and heavily bedded quartzites with the conformable interstratified gold leads are seen on both sides of the river dipping at a high angle to the south, and then within a couple of hundred feet to the north crumpled grey slates are to be seen lying horizontally and cleaved transversely; they are intersected by small auriferous veins which also have the general course of the district, east and west. The reverse dip of the dark slates is reported to exist about a mile to the northward. That the difference in character of these rocks from those of the middle group is, besides color and composition, not due to the relative positions of the planes of cleavage to those of deposition, is evident from the similarity in character of the rocks of the middle group in all and every possible position on the crown and sides of the anticlinal folds.

In the slate rock on which the City of Halifax is built, small veins of quartz carrying gold have been noticed; and apparently are of the same age as those at Tangier.

MINING EXPERIENCE.

Mining operations are not confined to the bedded leads, for rich streaks of paying quartz have been followed in cross leads and in what are called "angling" leads. As a rule true cross leads of later

age than the true leads are barren, or contain but a few pennyweights of gold. Their influence, or that rather of some so-called cross leads, on the productiveness of a regular lead is often remarked on, but cross-courses of later date are not always distinguished from contemporaneous connecting bands of quartz filling transverse fractures of the same age as the bedded leads. The effect of cross leads on the productiveness of regular leads is worthy of note. For instance, at the junction of a cross lead with the Belt lead at Montagu, some rich spots gave as high as 40 ounces to the ton. Then in the Discovery lead at Uniacke the quartz was found to be richer near the junction of what is there called a cross lead, but which in reality is an offshoot from the lead into the hanging wall, the quartz of both being homogeneous. A similar offshoot from a lead in area 629, Block II., at Carribou, marked the richest portions, and the stope, which cut the intersection, 40 feet wide and 20 fathoms deep, yielded 12,000 ounces of gold, chiefly collected about three centres on the line of the offshoot. Whether the yield of the bedded leads is in reality influenced by the position of the cross-leads may be doubted, and so of offshoots, for in many leads the number is great and a rich streak has many chances of being near one. It does not appear, however, to be a rule that the dip of the streak and the offshoot is in the same direction.

Crook's cross-lead at Lawrencetown connects two bedded leads 38 feet apart, and the richness of its contents seems to be governed by the contact of a small vein that is itself barren beyond the limits of the lead. No cross-lead is known to shift a bedded lead, though faults and breaks are numerous.

In the prescribed gold districts, besides the auriferous leads, there are other leads interbedded, which are barren. Some are known as Bull leads, often poor, compact, and containing little or no mineral matter; of unequal size and sometimes large, and as wide in places as 20 feet.

In sections where slate predominates, and there are few alternating beds of quartzite, the leads are almost invariably barren, or so sparsely spotted with gold as to be unprofitable to work.

Paying leads are generally small, of a few inches only, many will not average four inches in width, and one of eight inches is regarded as of good size. The Wellington, the largest regular lead mined, varies from ten to twenty-two inches in thickness. Sometimes a belt of small leads is sufficiently rich for a number to be worked together. On the Palmerston property at Sherbrooke, such a belt was worked eighteen feet wide, and yielded in a few months profits to the extent of $90,000. On extending the workings to the east, where the quartz thickened and several of the branches came together, the operations proved unprofitable. Of similar character was the Hattie lead at Wine Harbor, which composed of several bands of quartz within a width of seven feet, produced some parcels which gave 15 ounces to the ton.

Within the space excavated in mining, which is seldom more than three feet, and is sometimes as narrow as seventeen inches, it is not uncommon to find two or three leads quite distinct from one another as far as the operations extend; and while one is generally relied on as the paying lead, the produce of an adjoining lead may be also sent

to the mill, although more often thrown on the scaffold and waste heaps. Perhaps the smallest bedded lead that paid to work was the Irving lead at Mooseland from only an eighth to a quarter of an inch in thickness.

Very small "angling" leads have proved rich. They are true veins, which, while having the general east and west course, break across the strike of the rocks at slight angles. In depth they gradually steal across a bed of slate from one wall to the other, but on meeting a bed of quartzite, break short across to the next bed of slate, and so on, downward. In Oldham, the angling lead, on area 533, varies from half an inch to less in thickness, the quartz generally proving richest where it passes through a quartzite bed; while other similar leads yield best in slate. The Britannia lead, one of this class, thickens in depth to eight inches, on the surface in places it is unknown. In the St. Patrick's shaft at Montagu, several small streaks of quartz run side by side in the same fashion, the main one, only half an inch in thickness, proved rich where it passed through a quartzite bed.

The regular interstratified leads often show one character, which is very suggestive of true veins, strings and oft-shots of quartz extend into the walls from the leads, and are auriferous. One such string from the Wellington lead was very rich where it passed through the slate foot-wall, but barren in the succeeding band of quartzite. On the Alexandra property at Sherbrooke, an opening near a fault on the Murray lead showed a number of strings from the lead, a foot or so in length, entering the foot-wall; they proved to be rich in the few inches of slate on the wall, and a powder-keg full of sights from them gave 7 ounces of gold.

Sooner or later, in the working of the regular leads inequalities characteristic of veins are met with. Late operations at Waverley, in the east end of the Union lead, have shown the quartz to cease, while the fracture continues its regular course. The workings have also exposed a regular 'horse' of quartzite, and in one part of the foot-wall a roll of compact quartz eight feet wide, which in parts yielded handsomely. From the roll a number of strings of gold bearing quartz were found to ramify in all directions into the foot-wall of quartzite. One spot immediately below this roll gave 90 ounces from a lot of 5 tons; other strings in the foot-wall yielded largely. At a fault in this lead, drussy cavities contained crystals of quartz, galena, calcite, and iron pyrites. To mention one other instanee, the West lake at Uniacke contained a pocket beneath a swell in the lead five feet wide, so rich that one crushing of 13 tons yielded 234 ounces.

In the course of working, parallel leads are sometimes noticed to 'take in' in the adjoining bed of slate, one such layer of quartz came in the hanging wall of the Wellington, at a depth of 600 feet, and from it hand-picked specimens, weighing in all 30 lbs., produced 13 ounces of gold.

In both slate and quartzite walls of leads, crevices containing little or no quartz occasionally contain gold. One flat-lying crack in the quartzite wall of a strong barren lead at Uniacke gave 3 ounces of gold, where there was only a little iron-rust and no quartz visible. Gold is also found in the slate walls of rich leads, and from some mines more slate than quartz goes to the stamp mill. In the leads it

is found associated with calcite, mica, felsite, chlorite, with common, magnetic and arsenical pyrites, with copper pyrites, galena and zinc blende. Crystals of gold have also been found, and gold imbedded in crystals of quartz in cavities of leads.

There are yet other characters suggestive of true veins; often there is a narrow band of slate next the lead, which is called 'gouge,' on account of the ease with which it is extracted by a thin, long-pointed pick. Its fissile nature probably is due to disturbance at the time the lead was formed. Again, thin leads have been known to taper out, and what may be called their continuation to start in the side slate, and expand to the original thickness from beyond the termination of the quartz at first worked.

While many of the gold-bearing leads are regular and persistent for hundreds of feet, and lie parallel with wonderful uniformity, a careful following shows local troubles. Rolls and barrels and offshoots have been mentioned, and also their apparent influence of the productiveness of leads. Breaks and dislocations of the strata are not uncommon, and while many undoubtedly are of later age, some appear to be contemporaneous. A lead or fault divides the Sutherland lead at Sherbrooke, without shifting the strata, and on one side of it there are more bands and a greater thickness of quartz than on the other. Similarly the workings of the Plough lead at Wine Harbor have disclosed a cross fracture that can hardly be other than contemporaneous with the lead itself. Within a distance of two hundred feet the lead was found to increase from two inches in width to thirty feet at the cross fracture. Beyond the break, all efforts to find the lead proved abortive, and seemed to indicate that the strata were not displaced. Mistrusting the theory of the bedded origin of the leads, and judging the Plough lead as a true vein, I ventured, when the search for the continuation of the lead began, to dissuade the prospectors from their undertaking. The lead where it thickens is made up of a number of bands of quartz, many of which proved rich. These additional bands thin out in depth; and at a depth of less than two hundred feet the lead resumes its original thickness and is unprofitable to work. To instance the effect of a fault on another lead, one adjoining the Grapevine at Sherbrooke may be mentioned; in it the stopes were found to leave the regular slate bed and the lead to take an underlying one after cutting a small fault. Other cases have been noticed where the leads have turned into broken ground and then continued on in what appeared a different bed. The Hyde lead at Carribou, in its regular course west, flattens from 70° to 45°, continuing on in the same direction but for a short distance; but beyond where the turn of the anticlinal is supposed to be, the strata are found to dip at a high angle, and there a lead in the direct line of the Hyde is vertical and angling.

The workings of the Belt lead under a break, that shifted the lead, showed a small vein, running for the greater part parallel with the lead, much contorted as it approached the break, where it turned back and entered the lead about a couple of feet below the fault.

There is yet a structure occasionally met with in the regular leads that seems unmistakeably that of a true vein. Take for example the so-called Barton lead at Tangier, which averages about six inches in thickness; at one spot in the middle of the quartz was seen a flake of

slate about an inch thick and ten feet long. It had rough edges and had evidently parted from the hanging wall, for a trail of fragments led to the site from which it had come. Where it was the lead had an apparent greater thickness than the average, but the excess was made up by difference in thickness of the slate. Other leads occasionally show a ribbon-like structure, and sometimes fragments of slate not always lying in the place of the beds, but often across it. The question how the quartz became deposited is one of separate interest, though the appearance of some leads suggests a series of expansions of the veins and successive depositions of quartz. Fine flakes of slate, detached from the wall and adhering to the quartz, mark each layer, and give it a ribbon-like structure. The rolls and barrels indicate contemporary with the infiltration of quartz, or subsequent to it, movements along the line of rupture. In a regular bedded deposit the partings between the beds are smooth and the constituents of each bed uniformly mixed. The leads of Nova Scotia show no uniformity in the yield of gold, the pay 'streak,' usually of small extent, is of varying richness. The Dewar lead at Sherbrooke, perhaps the most exceptional presents the greatest stretch of paying ground, and though other leads have been opened a like distance over 1000 feet, operations have shown alternate sections of rich and poor ground. In it the streak tends in depth to the westward, and at 500 feet the stopes have made a westing of over 150 feet. The underlying middle and Wellington leads show the same westwardly direction of the streak, and more than that, so does also the streak in each of the overlying leads that have been marked. It is further of interest to note that in each succeeding lead the paying ground is to the west of the preceding and underlying pay streak, and so regular is it that the openings on the ten or a dozen leads worked within a distance of 5000 feet, present a line parallel to the axis of the anticlinal. In other districts this character is not so well marked, or has not yet been so well developed. Instances might be mentioned of paying quartz being found only in spots, certain leads being known to the miners as nuggetty as the Blackie at Oldham. The Hay lead at Oldham was a notable example, it contained one 60-ounce nugget and no more, so far as the stopes extended. It is a lead some ten inches wide, composed largely in parts of calc-spar. At the Fifteen-mile stream, croppings of 4-ounce quartz in one or two instances raised false hopes in the hearts of prospectors. The old adage, 'Where it is there it is,' seems to apply equally well to the contents of the leads of this country as to the metallic constituents of true fissure veins elsewhere. Yet there is a probability that whatever be the length of the workable patch of the quartz or gold streak, that the streak will extend to an equal depth; and also that in flat lying leads the latteral trend of the paying quartz is more marked and uniform than in those that are vertical. On the north side of the Sherbrooke anticlinal, the lead dips at from 45° to 50°, and, as has been mentioned, the streak dips to the west; on the south side, where leads are vertical, the streak has a dip in the opposite direction. The accompanying plan of workings on the Belt lead at Montague, shows by the figures the yield in ounces per ton of the parcels of quartz extracted from the spots indicated, and consequently the irregularity in the value of the contents of the parcels separately

crushed. Had the records of other workings been as carefully kept, they would doubtless have shown the same irregularity. Nor in any mine are the workings extensive; in the Wellington the extreme depth reached was 650 feet; nor has any mine yielded very largely. The most profitable was the Ophir at Renfrew, which cleared above all expenses some £25,000.

RE-CAPITULATION.

The distinctive features of the gold leads of Nova Scotia are their general conformability with the slate and quartzite beds and their regularity, suggesting that they are rather beds than veins. But there are characters that point to their being true veins in spite of these features, and they are the following. The roughness of the planes of contact between quartz and slate and quartzite; the crushed state of the slate or gouge on some foot-walks; the irregularity of their mineral contents; the terminations of the leads; the effects of contempory dislocations; and the influence of stringers and off-shoots on the richness of the leads. Characters that singly or collectively it would be difficult to account for, associated with a stratified deposit.

THE RELATIVE AGE OF THE LEADS TO THE GRANITE

May prove yet to be of practical importance in connection with gold-mining. On traversing the country, the hill tops are seen in places denuded of all detrital matter, save a few isolated boulders, and the junction of the granite with the sedimentary rocks is in many places exposed. At Mooseland, for instance, there are numerous exposures. In some places the line of contact between the granite and the sedimentary rocks may be seen, and tongues and veins of granite expanding into the open strata. In my own mind, I have no doubt but that the granite is an irruptive rock, and of later age than the gold leads. There is one spot on the barrens near the west shore of Moose Lake that is most suggestive, if not conclusive, of this view; a quartz lead rises somewhat above the level of the containing quartzite, and is capped by granite and also pierced by small tongues of granite. The local metamorphic effect, due to the presence of the granite, is shown in the formation of crystals of andalusite in the quartzite, just as at Cochran's Hill, Sherbrooke, garnets have been found in the slates. The crystalline structure of the granitic tongues protruding between the opened strata, seems to me to confirm the opinion that the granite is the newer of the two, for, like a chilled casting of iron, the crystals are coarse in the centre of the protrusions, when they have had a long time to form, and finer next the walls, from more rapid cooling in contact with the cold strata.

THE THROW OF THE LEADS.

Grooves and striœ on the surface of the rocks protected from further action by a covering of earth, are common throughout the country. To account for them, glaciers, icebergs, or ice-sheets, have been suggested, and have each their advocates. The interest they

have for the gold-miner and mineral prospector, is that they mark the direction in which the surface soil has moved. Generally speaking, in a north and south course. The experience of the prospector leads him, when he finds the 'throw,' the float, or shoadstones, as he calls the detached pieces, from a lead, to seek to the north for the lead, and he generally expects to find it within 100 feet of where the throw comes to the surface, on the hang of a hill and where the cover is heavy, at a greater distance than where the surface is flat and the soil thin. In exceptional cases, where rich throw has been found, trenches have been dug for many hundreds of feet and every inch of the ground examined without discovering the lead. The so-called Rose lead at Montague is still unknown, though the throw, or drift of similar appearance and supposed to have come from but one lead, has been traced for 1000 feet. During the past summer at Caribou, large boulders of quartz, weighing in all some 40 tons, were obtained at one spot. They yielded well, and extended search was made for the lead from which they had been taken, but the exploring trenches both to the north and south failed to find it. The boulders rested on the bed-rock at a spot where it rose to a level with the surface soil, which about it was deep.

Boulders of other rocks have been traced to their sources miles away. In the neighborhood of Halifax the drift contains fragments of limestone from the Lower Carboniferous, and of amygdaloidal trap from the Triassic of the Bay of Fundy, some 60 miles distant. A lump of iron ore was found on digging a well at Hammond's Plains, of similar appearance and composition to that of the nearest known ore, that of Brookfield, 30 miles to the north.

These instances are sufficient to show that while the drift has carried much of the throw of the rocks but a short distance, it has removed some pieces to very great distances. While in general the drift is from the north, some prospectors say on some hill-tops it is from the south, indicating, if such be the case, counter currents in the shallower waters, if it is supposed that the drift was caused by a northern current and not by an ice-sheet.

The substance of these remarks has been communicated to the Geological Society of London.

DISTRICTS.

CARIBOU.

Rich boulders were found at the east end of the lake, which not only promised well, but yielded so largely—nearly an ounce to the ton—as to pay the expenses of extensive prospecting for the lead from whence they had come. The lead unfortunately was not discovered, though the boulders were large, indicating a wide lead or heavy roll. Forty tons of the boulders were collected and crushed, of which 7 tons gave 15 ounces. Mr. Caffrey rebuilt his mill and engine-house destroyed by fire, and resumed mining the Hyde lead. In the mill

the use of blankets was tried, but hardly so systematically as to fairly test its economy. The pumping shaft on the lead is now down to a depth of 270 feet, and the stopes worked extend 200 feet.

In the Pioneer property a shaft was put down over 100 feet on two angling leads that have a slight inclination to the east; they are about 5 feet apart, and 2 inches and 7 inches thick. In the slate, the length of the shaft, 8 feet, the leads gave from one to two ounces, but in the quartzite they proved poor.

On area 424, a lead 3 inches thick gave some returns of 2 ounces, the stope taken down was 35 feet long.

The rest of the prospecting in this district by Mr. Tonquoy and others, did not result in finding ground profitable to work.

MOOSE RIVER.

This new locality has been a good deal prospected, but without any marked result so far. It has drawbacks in being more out of the way, wetter, and with more surface covering the bed-rock than many other districts.

On area 174, a double lead of 2 inches and 5 inches was exposed; it was traced on to area 172, where for a time it gave over one ounce to the ton, and also beyond to area 126, where it thickened but did not maintain its yield of gold. Exploration trenches in its neighborhood, extending 300 feet and averaging 10 feet deep, failed to find more than three small and poor leads.

An attempt was made to wash the surface, which at first, at any-rate, was not very satisfactory. For the purpose a race about half a mile long was made, and two flumes, each about 200 feet long, were built. The sluice in which the washing was done was over 300 feet long, but had not the fall that was desirable to clear itself. The returns show the quantity of gold thus obtained.

Other prospecting south of the Comstock lead uncovered a lead which was 7 inches wide and promised fairly with a yield of 17 dwt., which, if maintained, will pay.

FIFTEEN-MILE STREAM.

A large party of miners again tried the Jackson lead and prospected for others. At times they were encouraged, but not sufficiently to induce them to remain after a trial of many weeks. Two leads that they opened gave 4 ounces on top and but little or nothing at the next crushing. Messrs. Hall still have faith in this district, and believe that they have exposed a lead or two from which the rich boulders, that have drawn prospectors to this district, have come.

GAY'S RIVER.

The workings on area 3 have been continued, and the incline drift along the bed-rock extends 200 feet; the lateral workings extend into the runs about 60 feet. Little of the conglomerate is taken, chiefly the top slate, and care is taken to follow the open backs, which are filled with clay and often contain pockets of gold.

Other openings were made adjoining Mr. McClure's property, but no profitable runs in the slate or overlying conglomerate were struck.

LAWRENCETOWN.

The promises which the discovery on area 280, mentioned last year, held out, were not realized, and the little work done in this district was in prospecting and proving the extension of the discovery referred to. Mr. Crook opened on the east side of the river the main lead, which on the west side is intersected by his well-known cross lead. It is 4 to 6 inches thick, but was not found to contain much gold. The cross lead was worked to a depth of 47 feet. It really is a connecting band of quartz crossing the metals from another bedded lead 38 feet to the north. Looking south, it is broken by faults, which shift it to the east, in which direction it has an inclination. The rolls in it are nearly vertical. It yielded well when the rolls were cut by a fender on the foot wall, but neither alone were rich.

At Chezzetcook in the Spring, strong interest was taken in some leads, which, on being worked, failed to justify the hopes of the explorers.

MONTAGU.

As is so often the case with tributers who take an abandoned mine, fit it up and pump it out at considerable expense, the tributers who re-opened the cross lead got barely more than a color of gold for their time and money.

Nor were those who took the Lawson Mine or Albion mine on the Belt lead much more fortunate, though their first crushing from the West bottom stope did give about 2 ounces to the ton. In their explorations they drove a tunnel west at a depth of 80 feet into the Symonds property; and also they sought for the intersection of the angling lead, which cuts the Belt lead, with the parallel Iron lead 12 feet north, hoping to find a rich pocket, as was found at the intersection of the Belt lead, just above where they tried. This angling or cross lead in its downward course breaks straight across a whin bed, but gradually inclines to the north in slate. Work on the eastern end of the sett on the Belt lead was continued at a depth of 200 feet, and a stope of 30 feet taken down 40 feet, but the lead there is thin. An exploring tunnel was also driven east, just below the intersection of the angling lead.

At Bendigo some mining was done on Mr. DeWolf's thick lead to a depth of 80 feet, and a great deal of prospecting for the source of large boulders that gave in some instances over one ounce to the ton, but without success. Other areas and places in the neighborhood were tried, but nothing of value found; for instance, on the Preston road, near Furguson's, on a lead which, being in a slate belt, was hardly to be expected to be worth working.

WAVERLEY.

Mining on the Union lead, area 169, was abandoned in March, it having been for some time unprofitable. The stopes had been taken down to a depth of — feet in the pumping shaft, and they extended — feet on the lead.

The north Tudor or Brodie lead was then opened, area 133. On the surface it was 10 inches thick, but reduced to 7 inches at 60 feet down. It dips north and has been mined to a depth of 140 feet. On the foot-wall the gouge, bulk, or crushed slate assists the mining as good holding, in a seam does coal cutting.

Further prospecting by Mr. McClure on American Hill discloses nothing of value. Mr. Huff found on area 185, in a bed of slate 12 feet wide, seven leads, which gave a total thickness of 56 inches of quartz. On area 189 he struck rich quartz 6 inches wide, but which on either side, within a distance of eight feet, thinned down to one inch and a half inch thick, and at a depth of 5 feet disappeared. On Laidlaw's Hill three parties of tributers worked on the edge of the northerly dip, and in the early part of the year struck some rich barrels.

OLDHAM.

Mr. Baker continued to work his rich lead with large profit during the first half of the year, and the three shafts taking down a stope of 60 feet, reached a depth of 200 feet. The lead is very irregular and ill-defined; in places completely cut out, for instance, at the intersection of angling leads, which appear thrown by the lead 4 to 8 feet and to be reversely faulted. The lead is also pinched in a vertical direction, and between the middle and the north shafts there is a block of ground 30 feet wide. The lead is itself faulted, and off-shoots go off from it into the hanging wall.

In connection with the excellent engine for pumping the mine, a mill of eight stamps was attached.

A lead still further east, on area 143 (?), yielded well to a depth of 30 feet.

Another rich spot was struck on the Britannia lead, an angling lead that often has been found to thicken in depth to 10 inches, and yield well.

The rest of the work in the district was chiefly on the surface or in spots of leads left in previous workings, and altogether of no great extent.

RENFREW.

The extensive prospecting and further trials of already discovered leads in this district have not met with marked success. Work on the McLeod was stopped as the lead became poorer and thinner in depth, on area 369, and when the pumping shaft was down 120 feet, the second 100 feet west 70 feet, with east stopes extending 50 feet beyond the shaft. The same lead was tried 750 feet west, with no better scccess.

Later in the year the Hay lead was worked with some prospect of its paying expenses.

SHERBROOKE.

This important district, though it maintains its leading position, fell short in its yield of that of the previous year.

The veteran Wellington mine was again closed. In it the stopes extended at the bottom 300 feet west of the shaft, and 180 feet below the shaft bottom, 500 feet down. The accompanying Dewar lead continued to pay for working, especially in the westwardly course of the gold streak; its deepest shaft has attained a depth of 480 feet. The intervening Middle lead has developed most satisfactorily, and already 240 feet of stopes are open, partly to a depth of 120 feet. The shafts on this lead are well fitted up.

The Blue lead was re-opened on area 615; the original workings had been taken down 300 feet, and stopes extended west 125 feet. The lead is in parts 10 inches thick. The workings in the overlying big lead in the same area have about the same depth and extent.

On the adjoining area, 614, Mr. Zwickel mined the Middle lead, which though thin, continued rich down to the depth worked—200 feet. The continuation of this lead on the adjoining area, 613, the Gladstone Company had opened to a depth of 180 feet. The McClure lead, which overlies the Middle lead, was found to carry the gold irregularly. An underlying thick lead was also opened.

On the Hayden and Derby property, the Harrison lead was re-opened to test whether the gold streak was really cut off by the break which was made the western limit of the first operations, which reached a depth of 280 feet. The result is unknown.

On the southern side of the district little important mining was done; tributers chiefly sought for blocks left unwrought that were supposed might be worth taking out.

At Goldenville an additional water mill has been built by Mr. Hattie.

On Cochran's Hill several leads were tried that gave good returns on the surface. On going down on them they were found irregular in thickness and in yield. Some thinned out completely. The presence of garnets in the slate of this district indicate extreme metamorphic action. At the end of this district—at the Crow's Nest—leads opened yielded but a pennyweight or two of gold.

STORMONT.

The one lead mined on area 4 yielded fairly in the winter, but owing to troubles among the owners, working ceased until late in the autumn. At Country Harbor Narrows, in this district, some quartz was got out, which, however, yielded but a poor return.

TANGIER.

At Mooseland little was done; some prospecting and a few crushings taken from eastern end of the Furnace and Irving leads.

At Tangier, mining on the working lead traversing the ground, from whence the washings had been taken, was stopped, after opening 250 feet on the lead, at a heavy fault. In the best part of the lead a 90 feet stope was taken to a depth of 92 feet.

Then a lead in the same strike further west was opened by three shafts to a depth of about 40 feet. It is troubled, and splits up as it nears a large fault. Tributers worked it at 35 cents a superficial foot on the lead, timber being found them. Opposite these openings, on the south side of the road, the supposed extension of the Niger lead was opened, where it promised to yield well.

The true Niger lead was re-opened from the old tunnel by a winze down 35 feet to the west of the tunnel; a 60 feet stope worked the lead to a break. It is from 6 to 12 inches thick, and in parts yielded well.

The well-known large Leary lead was re-opened for 800 feet, by two sets of tributers, at a 6 p. c. rental. The summer being dry, a large quantity of quartz was cheaply mined, and a fair yield obtained. The stopes were taken from above the 20 feet horn level to the east. To the west of the pumping shaft a tunnel goes in some 200 feet, making the total length of stopes about 1000 feet.

From Ecum Secum some quartz was brought to the Tangier mill, which contained a paying percentage of gold.

UNIACKE.

Operations on area 614 were again entirely abandoned. The most successful mining was on area 717 (?), by Mr. McIntosh, which he worked for nine months after the small lead on the Toronto property, which paid him well the year before, failed. This new lead varied from 3 to 8 inches in thickness, and yielded a good return on a narrow stope to a depth of 70 feet. The streak dipped to the east between a deflection of the lead and a feeder on the north wall, dipping at an angle about 45°.

On the Montreal property a lead was found in the autumn, which yielded fairly; it was worked by two sets of tributers.

Other ground was broken on the Queen and Prince of Wales properties, but no permanent works established.

WINE HARBOR.

The Plough lead was partly pumped to enable tributers to get at the overhanging bluff, left on the first working of the lead, and the crushings of the quartz obtained left a small margin for the tributers. Those engaged on the Mitchell lead did better, and they took down a stope of 120 feet in part, 20 feet below the tunnel level, or 100 feet from the surface. There was also some prospecting on the Barrens, but this district as a whole fared badly.

ACCIDENTS.

The array of casualties for the present year is more serious than any since 1873. Of the accidents reported, seven occasioned the death of thirteen persons. The most calamitous being an explosion of gas at Sydney Mines, killing six, and an explosion of a boiler at Port

Hood, fatally injuring two men. Besides the accidents that terminated fatally, several so seriously injured the victims of the accidents that they were maimed for life.

The direct cause of the more serious fatalities will be found mentioned below. The indirect causes of some others are not difficult to surmise, either in laxity of discipline, inferiority of material or carelessness of individuals.

Closely connected with this matter is the punishment of persons for breaking the mining laws. Several cases came up during the year before local magistrates, and fines were inflicted for smoking in a place where safety lamps were used, for leaving a ventilating door open, and for entering fenced places. One case that came before the Stipendiary of New Glasgow was thrown out of Court, on the ground that the men who, in that particular case before him, entered a pit without leave, and went where they had no business to go, were strangers, and not workmen, and therefore did not come within the meaning of the Act.

FATAL ACCIDENTS.

1. January 14th—James Chevill,—By a fall of frozen ore in a surface heap at Londonderry.
2. February 15th—Alexander Watts, aged 56, married; and Angus Gillies, unmarried,—By an explosion of steam boilers.
3. May 21st—Isaac Greenwell, Manager, aged 58, leaving a family grown up; William Oram, Overman, aged 50, leaving a wife and five young children; Murdoch McDonald, aged 60; Roderick McNeil, aged 62; Robert Hutcheson, aged 22, single; and Edward Millville, aged 20,—All by an explosion of gas at Sydney Mines.
4. May 23rd—Francis Colin, aged 15,—Run over by a pit tub at Acadia.
5. May 23rd—Guthrie Holland, single,—By a fall of roof stone, Albion Mines.
6. September 16th—William H. Strong,—Run over by a locomotive engine, Spring Hill.
7. November 8th—John Penrose,—A fall of ore from a stope at Londonderry.

EXPLOSIONS OF GAS.

Four were reported—three at Sydney Mines and one at the Acadia.

The dire explosion at the Drummond pits in 1873 aroused the coal miners of Pictou County to a sense of the risk ran in working in fancied security from explosions of gas, in overlooking any precaution, or in relaxing a strict discipline. The same wholesome dread of the miner's subtle enemy, fire-damp, did not impress itself to the same extent on the workers in Cape Breton, where an evident though unexpressed feeling animated the miners that similar care and discipline were not so requisite. But a severe lesson has since been taught them, and in a mine where the management gave great confidence to those engaged.

During the past winter the work of opening out the levels and deeps from the Lloyd's Cove pits at Sydney, was pressed on with a consequent lengthening of the air courses. For ventilation from 18 to 20,000 cubic feet of air per minute were circulated, and with care conducted past the working faces. Yet some slight explosions occurring in the spring of the year showed the need of extra caution to meet the increased exudation of gas in this winning. At the face of the level from the S. E. deep, gas was noticed, and in March a man was slightly burned within an hour or two after his place was examinated in the morning. Again in April another man was burnt by gas through leaving his place, a headway, and entering an adjoining one that was standing and fenced off until his was up and holed through. A third accident occurred at the same place a week later when the cross-cut was through. It was directly due to the fall from a shot choking the face and temporarily checking the ventilation round the end of the brattice. These small explosions occasioned a correspondence, in which stress was laid on the General Rules bearing on the subject of sufficient ventilation, the thorough examination of working places, and the enforcement of discipline. The first suggesting an insufficiency of air, though the brattice was conducted near to the face, and the second the advisability of enforcing discipline, for the man McPhee, without authority, entered a place not his own, and one which though bratticed was guarded by a danger board. The agent was advised that McPhee should be prosecuted, as an example, to ensure discipline, and to show that he intended to be guided by the spirit as well as the letter of the mining law.

The circumstances that so shortly after led to disaster might not singly have resulted in accident, but happening together, occasioned one hitherto unequalled in the annals of coal mining in Cape Breton. They further show how difficult it is to get men to implicitely obey instructions, though written out for them and even impressed upon them, especially when the instructions and their practice are nearly identical. Immediately after my correspondence, the general and special rules were read over to the deputies, and strict attention was enjoined on the management by the agent, yet as the following account demonstrates, the rules in some cases were not strictly carried out.

On the morning of Tuesday, May 21st, a blast of air and dust up the unfinished winding shaft intimated only too plainly that some serious explosion had occurred in the workings. The agent, with some volunteers, immediately hastened below to render assistance to the imprisoned men, and supervise the work of restoring the ventilation in the absence of the under manager and overman, who were among the missing. It was at once evident that the explosion was confined to the north side; no damage was done on the south side, even some men continued to work unconscious of the accident. In the mean time, the deputies at the pit bottom organized an exploring party and assisted in the escape of the men from the rise workings. These were much affected by the vitiated air through which they had to pass, the explosion having destroyed the doors and stoppings on that side. Their escape reduced the number to be accounted for to twenty men, and indicated the deeps as the scene of the explosion;

there the explorers set to work to restore the air courses and rescue any men still alive.

To explain the position and cause of the explosion more effectually, it may be well here to discribe the district. Near the pit bottom an engine plane starts to the deep in a northerly direction, and at a short distance branches off to the S. E., both planes to win the coal lying seaward of Cranberry Head.

The S. E. deeps had been put down 1000 feet, and from them a pair of levels were driven southwardly to a distance of two chains, beyond a cross-cut that cut the faces of a few parallel rooms to the rise of the levels. Work in these deeps had been standing for a couple of months, but it was to be shortly resumed. From the N. deeps, levels and rooms were being worked in the opposite direction, and they were much further advanced than those to the south. It was fortunate that they were so, or the loss of life that resulted undoubtedly would have been greater.

When the volunteers had carried the air in as far as the upper room of the N. deep workings, they saw at the face the naked lights of men, who had been prevented from escaping by the after-damp that lay between them and the shaft bottom. One man, R. Hutcheson, lost his life in attempting to get through it. On the approach of the exploring party, these men rushed through the bad air, some unaffected by it, while others dropped under its deadly influence and were with difficulty rescued. To mention the names of those who especially distinguished themselves in the work of rescue, would be invidious, for several devoted themselves to the imminent hazard of their own lives. The explorers then turned their attention to the recovery of the bodies of the lost, six in number. Edward Melville, a driver, was found in a cross-cut, where he had made his way after the explosion, and was overcome by the after-damp. The road men, M. McDonald and R. McNeil, where they had been working on the plane-way, and the under manager, with the overman, in the upper level of the S. E. deeps.

It appears from the evidence adduced at the inquest, that the explosion was brought about in consequence—1st, of the ventilation of the S. E. deep levels having been destroyed for nine days; 2nd, in the under manager and overman having entered places, not working places, and as such daily subject to examination, with naked lights; and 3rd, in the danger-board, required by the Special Rules, having been so placed that it did not prevent persons from inadvertently entering without passing it—a place daily examined.

The evidence of the deputy, George Ray, was to the effect that on the previous Sunday but one, a canvas door was required for some place on the south side, and that the under manager gave permission for the removal of one which turned the air going down the S. E. deeps into the levels; at the same time he ordered, it was said, the danger-board to be put in the upper level. His sanctioning the removal of the door was corroborated, but there was no evidence to show that he had ordered the replacing of the door, which, for a man so generally careful, it is probable he thought he had done, even if he failed to give the order, and knowing as he did that at the face of the level a man had been slightly burnt in March. His ordering the

danger-board to be put in an improper position did not altogether exonerate the deputy from his share of responsibility, unless the deputy had first protested against the selected position. I mention this for the advice of deputies generally.

On the Tuesday morning the under manager and the overman together entered these deeps to arrange about re-working them. They carried naked lights, which is incomprehensible in the face of the General Rules 2 and 4, and the Special Rule, *Deputies*, 7 ; though it is possible that the under manager did, or intended to, try all suspicious places with his candle, for he prided himself on the steadiness of his hand, and he alone carried a candle. They reached the upper level, at least within a chain of the face, and then, whether they unexpectedly fired the gas, or whether they had detected its presence and had turned to retreat, can never be known. But the lamp of Oram being found just inbye of Greenwell, and their usual practice when travelling being for Oram to be some paces in the rear, would suggest that Oram had been where his lamp was found, that he had dropped it when the gas fired and ran back. This is presumably confirmed by the finding of his body, some 20 (?) feet back, on the low side, between the props and the wall, and more burnt than that of the under manager, who dropped, with his face covered, in the road-way.

Where they fell, the coal was not coked or the props disturbed, but in the lower level the evidence of intense heat and great violence were manifest ; on the high side the coal was coked, and the props that were not knocked down were charred on the inbye side for a distance of 150 yards. The blast swept with violence up the deeps and burst through a cross-cut into the north deeps, where the road-man, M. McDonald, was working ; the blast split at the cross-cut, the major part taking the direct return to the rise, and part going down the north deeps, overpowering the other road-man, R. McNeil, on its way. In the level below, a door was overturned on a trapper-boy, who was also slightly burnt, but who was rescued. McDonald was crushed by the fall from the roof, and also somewhat burnt. All the other sufferers, the doctors affirmed, fell from the after-damp, and in no case died from injuries.

When it is remembered that the levels from the S. E. deeps were in only two chains beyond a cross-cut to the rise, and were connected by one within two yards of their faces, the position is not one where it would be generally suspected much gas would lay, and possibly gave undue confidence to the management. The workings of the new winning are dry, and the road-ways are deep in dust, which a blast undoubtedly would raise in clouds, and, mixing with the air, add fuel to the flame.

The agent, Mr. Brown, in his evidence, stated that " he had every confidence in the ability and experience of Mr. Greenwell ; that the ventilation was entirely left to him to regulate, subject to his approval ; that Mr. Greenwell had full charge of the pit for more than 13 years ; and that he knew of no complaints having been made of bad air." It was also stated that the men had entire confidence in him.

On the 3rd June, a slight explosion took place at the face of a plane-way which was being driven in the Acadia pit. The place was examined only two hours before, when the shift started, and when

there was no gas. It is supposed that a small feeder was cut, and that the gas accumulated while the men were cutting up the bench for the brattice. J. W. Sutherland was so much burnt that he was off work for three weeks; W. Wilson was only slightly burnt.

BOILER EXPLOSIONS.

In last year's report the matter of boiler explosions was gone into at some length, the more common causes were mentioned, and the beneficial results of boiler insurance dwelt on. A disastrous explosion was referred to in detail, and in a foot note mention was made of another that occurred early in the year now under review; subsequently two other explosions happened at collieries, one of which was attended by fatal results. The cause of each is not difficult to surmise, and will be suggested as each case is mentioned. They all demonstrate the folly of that economy, so called, which asks for cheap material, put together by ordinary workmen, and improperly or incompletely fitted, and does not employ competent persons to periodically examine the condition of so dangerously powerful a servant for good or ill as a steam boiler.

January 9th.—At 10 P. M., one of the set of seven boilers at the Victoria Colliery, Cape Breton, exploded and severely injured a young man, Stephen Livingstone. A foot-note on page 10 of last year's report mentioned this occurrence, and referred to a demand that had previously been made, that the manager should comply with the mining rules respecting boilers. This demand, though promised six months before, it then appeared had not been complied with, and proceedings were about to be taken against him, when it was found he had resigned his office, The neglect was so gross, that had the young man died and a coroner's jury been made acquainted with the facts, a verdict of manslaughter against the manager would probably have been rendered. The following extract from a letter, dated June 18th, 1877, will explain the condition of affairs previous to the explosion:— "*Sir*: I regretted not seeing you when at the mines on the 11th inst., "for I desired to speak to you of matters I was sorry to find unat- "tended to. I had hoped that my letters to you in 1875 had made "clear to you our mutual positions in relation to the Mining Law. "And on reviewing my correspondence and conversations, I hardly "knew how to impress upon you the necessity that you, as an agent "of a mine, must comply with the requirements of the Mines' Regula- "tion Chapter. I cannot believe you intend to set the law at defiance, "and therefore write to you once more, trusting that you will relieve "me from bringing an action, by at once making yourself familiar "with the law and complying with its regulations. After the passing "of the Act, I drew your attention to it, and pointed out the General "Rules, &c. When I next saw you, and found the Act ignored, you "promised a ready compliance. I then spoke of a matter or two that "required to be remedied, and dwelt on your having a proper plan, "and a copy of the abstract of the Act kept posted in a conspicuous "place; subjects that had again to be spoken of. Subsequently I "wrote authoritatively of such cases of non-compliance as I had

"noticed, (among them 'a proper safety-valve'); and also explained "that I am neither required to point out every neglect, nor that you "are excused by any oversight of mine.

"You and not I are responsible for non-compliance with the law. "Last year I trusted in some points to your compliance, and overlook- "ed visiting your engine-house and boilers. This year my astonish- "ment was great when, after all I had said on the subject, I found "but the one safety-valve, and it overloaded, and the exposed boilers "still covered with cinders, against which I protested. * * * * "General Rule 24, requires a water gauge and safety-valve for *each* "boiler. One steam gauge for each *set* is permitted by general agree- "ment, before the Commissioner and Committee of the House. * * "Any connivance on my part at neglect would be culpable, and I "must have, with all reasonable despatch, a safety-valve placed on "*each* boiler." * * *

A correspondence ensued, which resulted on the 18th August in the agent writing:—"I have to advise that the Company have order- "ed a safety-valve for each of the boilers in use, and that they will "be placed in position as soon as they come to hand." The same letter went on to state that, "The following is an extract from a letter of "Adam McKay, Esq., the maker of the boilers, dated Halifax, 3rd "August, inst.:—'Regarding the pressure you could with safety carry "on the boilers, I beg to inform you that, when new, they should stand, "according to present Dominion law, a pressure of 128·5 pounds, "working pressure, and were then tested to 150 pounds. You may "therefore govern yourselves according to this standard, making a "reasonable allowance for depreciation, dependent upon the care which "has been taken of the boilers.'"

NOTE.—The Dominion law allows the extreme working pressure to be two thirds of the test in the case of marine boilers, so that a test of 15 lbs. would allow a working pressure of 100 lbs. not 128·5 lbs. The Hartford Boiler Insurance Company allow only one half the test which would be only 75 lbs.

Upon receipt of such an assurance I took no further steps, and was surprised to find out after the explosion that although the valves were obtained at the time stated they had never been put on, and that the one valve on the main steam pipe was retained with additional weight on the lever to prevent the loss of steam. When two years before I required "a proper safety valve." One new *one* had been procured and allowed to get into an equally disgraceful state with the one replaced. When last on the ground previous to the explosion I enquired how often the boilers were internally examined, and the man in charge of the machinery distinctly told me that he himself went into one of them about once a month, thus giving to each boiler an internal inspection semi-annually. Such unusual attention surprised and impressed his statement upon me. I was less surprised to find the firemen and others who had been about the place for years afterwards say that to their knowledge not more than four internal entries had been made altogether, and that in the whole set of seven, during four years when, after the explosion, an examination was made of the

remaining six, some of the stay-rods to the ends in all were found broken; the fractures all appearing to be old; and on removing the scales from the interior of one a hole was made through the shell by the hammer.

Immediately after the explosion Mr. Rumble, of Lorway, a mechanical engineer of very great experience made a thorough examination and kindly gave the following information.

"I examined the boiler which had exploded and now lies 115 yards from its original seating, the furnace end blew out in the opposite direction and carried with it, the pump-tender, Livingston, fully 200 feet. The boiler had originally five stays to each end; the middle of $1\frac{1}{8}$ in. round iron, and three of the four 8 inches from the circumference of the end had evidently been broken for some time; for while the laminations in the fractured plate had fresh edges, the end of the stay rods were black and rusted. The sound stay still held a portion of the boiler end, the vent having followed round the flange with this exception. There was no bulge over the fire or appearance of overheating. The boiler is 30 feet long, 3 feet in diameter and of $\frac{3}{8}$ in. plate apparently of good quality. I examined the one safety valve which had been on the main steam pipe, it was closed and could not be moved by my hand for the spindle was corroded and caused much friction in opening. A calculation made the pressure load on the boiler when the weight was at the end of the lever, 80.26 lbs. Of late the weight had been placed 5 in. from the end, which would reduce the pressure to 75 lbs. supposing the valve to be in order; but previous to that additional weight had been put on the lever, and the pressure unknown. The steam gauge registers to 100 lbs. and is placed in the engine house, a defective and useless steam gauge is immediately in front of it. To enable the fireman to see the gauge, a hole is in the wall of the engine house, so placed as to enable him to see over the defective gauge from the outside. (In my correspondence of the preceding year, when trying to rouse those in charge from the slough into which they had fallen, I went so far as to write:—'Your steam gauge is awkwardly placed behind another whose presence would be a disgrace to most engine-houses and engineers'—but without effect.)

"The globe-valve connecting the boiler with the main steam pipe was torn away by the explosion from its connections. I very carefully examined this valve, and found it blown out of its seating, and obstructing the passage from the boiler to the steam-pipe; to this, together with the broken stays, may be attributed the explosion. Had there been safety-valves fitted, this accident would not have happened.

"These boilers are under any circumstances over pressed for the thickness of plate. No gauge glasses were in or upon any of the boilers when the accident took place. I examined the gauge glass fittings and found them choked up with packing and dirt, showing the correctness of the fireman's testimony. When boilers are exposed to the weather, without a boiler-house, it is almost impossible to prevent the gauge glasses from breaking.

"Both the day and night firemen were on the ground with Livingstone, who was up from the pumps to eat his supper. Their evidence was to the effect that all the boilers had been fed with water within the hour, and that if any one was short it would have been one at the

other end of the set, first pumped up; that within the half hour, the water had stood at the second of the three guage-cocks in the boiler that exploded; and that the safety-valve was blowing off. They had never known the gauge to register more than 75 lbs.

"My opinion is, that the globe-valve blew out of its seat, and contracted the orifice so much that the steam could not pass from the boiler as fast as it was generated, and the accumulated pressure burst the boiler; observing also that the boiler was already weakened by the stays being broken.

"One thing I would call your attention to in the construction of globe-valves such as this one, with cast iron chests and brass valves, how small are the surfaces for friction, although parallel, to keep them in their places. To keep the valves down they should have a flange and a few small bolts. The least carelessness in the men fitting in the valve, leaving it a little too slack, will do all the damage. As a practical engineer, I know these things do happen, and I have always regarded safety first, economy second; and in safety I have always experienced economy."

. This report of Mr. Rumble leaves little room for doubt but that gross mismanagement led to the explosion. The manager, from want of technical knowledge, seems to have been unable to distinguish between true economy that he desired to practice, and the appearance of it, which sloth and neglect produce. The extracts from my correspondence I give as an illustration of my remarks of last year, page 6—7, respecting the practice of "impressing the advisability of strict compliance, and if need be, 'with all the insolance of office,'" rather than by appealing to the law, the more public method. A change in management in this case alone prevented an action being brought, for the owners were not liable since they authorized compliance by the manager. But it is to be hoped that this statement, publicly made, will have a beneficial and deterring effect on those inclined to overlook the wise requirement of our mining law, equal to that which an action at law would have.

March 8th.—A much more disastrous explosion of a steam boiler occurred at Port Hood. Three weeks before the house over the engine and boilers had been destroyed by fire, but as the walls had been pulled outwards at the time and no burning material allowed to rest upon the machinery, no damage was supposed to have been done. The boilers remained half full of water after the fire was out. There were two, 30 feet long, 30 inches in diameter and of $\frac{1}{4}$ inch plate. They were made at New Glasgow and had been set up two years, but little used, and showed no signs of corrosion. An external examination showed no signs of injury though it was thought that a leak in the top of the north boiler was worse a little than before. A machinist was at the time of the fire down from Halifax and he thought the leak would take up. Steam was got up and the boiler used. On finding that the leak did not take up, it was caulked one evening, the next morning the boiler exploded and immediately afterwards the second boiler blew up.

The explosion overturned the engine house which had been rebuilt and one of the two men inside it at the time was so severly injured

that he died within a few hours. The other man escaped unhurt. The engine man who was firing at the time was scalded, and died from the effects in a few days. Some three other men were shingling the engine house and the manager stood by when the accident occurred. They all escaped.

At the inquest, which was immediately held, it was not thought necessary to call the inspector. When later I saw the remains of the boilers it was impossible to say whether the fractures were all fresh or in part old. In both cases the fractures followed closely the line of rivets of the third ring from the back end, and the nearest point to the suspending rod. In the north boiler the crack followed the line of rivets all but for some six inches. In the south or second boiler to explode the rent followed the rivets for about two thirds of the circumference. The pressure of steam was said to have been 52 lbs., the boilers having been tested to 125 lbs.

The two pieces into which the north boiler was divided were thrown 150 feet apart; those of the second to nearly 500 feet rising in their flight to greater heights than those of the north boiler,the large piece for 80 feet of its course mowing down a grove of spruce. The indents in it caused from striking obstacles in its flight were all cracked, and one hole made through had several radiating rents with little bending of the plate, leading one to suppose that the quality of the iron was inferior.

As no internal examination of the boilers was made after the fire it is impossible to say whether the rents between the rivets were already started, but it is presumeable that it was, and that the caulking of the leak increased the strain. The marks of the caulking iron are very plain. That the rent started from the upper side where the leak was is probable because the ends in their flight had a low trajectory and were propelled a comparatively short distance; differing from the case of the second boiler, the ends of which flew high in the air and to a greater distance. The cause of the explosion of the second probably was due to the explosion of the first lifting its back end from the seat and also knocking away the supports of the two baulks on which both boilers were hung and allowing it to fall back unsupported in the centre, The strain to which such a boiler, only 30 inches in diameter and 30 feet long, when three-fifths full of water, would then be subjected would cause it to give way, even were the quality of the iron superior.

May 29th.—The third explosion during the year occurred at the Gardener Colliery. The water used was partly from the pit, and was corrosive in its action. Of the set of four, two were laid off and undergoing repair. The workmen had left but half an hour, when a hole blew out in the side of one of the two in use. The explosion disturbed the boiler in its seat, broke the connections and knocked out the fronts. The cause was apparent enough. The boiler had been repaired eight months before, a half plate put on over the fire and this plate had corroded about the water line until in part it was reduced to 1-50th of an inch in thickness. The hole made was about 15 in. by 10 inches. The plate used for the repairs of the previous autumn was taken from the boiler that exploded at Lingan in the previous spring.

EXPLOSION OF POWDER.

In February, a miner in the Vale pit approached a shot that hung fire, and as he did so, it went off and cut him severely in the face and hands. This is the only reported case of an explosion of powder causing injury to a miner.

FALLS OF COAL, ORE, AND STONE.

In this, the largest class of accidents, three fatal occurred. The first in January, at Londonderry, from the fall of a frozen mass of ore in a surface heap, at which James Cheville was engaged in filling cars.

The second accident happened in the Foord pit, from a fall of stone from the roof, between the first set of timbers and the face of the board. The piece that fell on Guthrie Holland was about 3 feet by 2 feet and 4 inches thick. The rock about was quite sound.

The other fatal accident was at Londonderry, from a fall of ore in the stope above the shallow level. The last report mentioned two accidents as having occurred during the previous year from the same cause. They happily were not fatal.

Eight other accidents belonging to this class were sufficiently serious in their character to be reported. They caused injury to ten men, and from inquiries made, they were mostly due to want of judgment and care on the part of the men themselves, either in taking down a fall that hung after a shot, or in neglecting to sprag a holing.

MISCELLANEOUS CASUALTIES.

Ten other accidents were reported, two of which resulted fatally. The first at the Acadia pit in May. Francis Collin attempted to get on a rake of tubs in motion, and slipped, the rake passed over one of his legs and crushed it. It was amputated at the time, but he died three weeks later. The other was a very painful accident. Strong was a brakesman on the Spring Hill Colliery branch road, and while the train was in motion he attempted to step upon the tender; his foot slipped and caught in frog of a turnout, and before he could extricate it his leg was torn off at the knee joint.*

Of the non-fatal, four were in connection with machinery, either while working about engines in motion or gear driven by engines. An "incline boy" named McKenzie changed duties with another, and while riding up on a back-balance, fell off, and was caught by the descending counter-balance, which crushed him severely, and seriously threatened his life. A man while engaged banking coal tipped his tub too far, and falling over with it, received severe injuries. Another man, while attempting to cross a room in the Victoria pit while the coal was running down to the shoot, got his leg crught by the coal

*Another very distressing accident occurred at the same colliery late in the year. A son of the Manager caught his hand in the revolving screen, which drew in his arm and crushed it to the shoulder. It was amputated, and although the shock was severe, hopes are entertained of his recovery.

and injured. Another accident which happened at the last mentioned colliery, shows how necessary it is as far as possible to fence in platforms and exposed places. The night bottomer on coming up, stepped over the edge of the platform, and fell on the boarding at the slope top.

RELIEF FOR THE WOUNDED.

The above record but badly infers that great suffering was entailed by accidents about our mines during the year. To entirely prevent accidents is impossible. To be prepared for their occurrence, which amounts almost to a certainty, becomes a duty. Medical men are promptly on hand about large establishments, ready to succor the injured; but still much valuable time is often lost in bringing the wounded out of the pit to the doctor, and much unnecessary pain, if not agony, is endured by the sufferer in the operation, and all for want of a little general instruction of how to handle a wounded person.

The St. John Ambulance Association, of England, has taken this matter up and caught the attention of the British public, so that today all ranks of Society in London crowd their classes for instruction. The movement is spreading throughout the Kingdom, and to show the cause of its popularity, I cannot do better than quote the language of Major F. Duncan, Vice-President of the Association, when advocating the establishment of classes in the colliery districts. He said before the Chesterfield and Derbyshire Institute:—"He supposed that they would all agree that there was much suffering in the world in the time of peace, which it is desirable to ameliorate, and much ignorance, which it is desirable to remove. If peace has its victories, so also, unfortunately, it has its casualties. Yet how often was it that an accident occurred and there was no one present who knew the simplest thing until the doctor arrived; there might be men of education, and possessed of kind hearts, yet utterly ignorant of how to apply pressure of the thumb or the hand in the right place. Their object was to teach men and women how to deal with ordinary cases of injury, until the doctor arrived. They did not aim at usurping the functions of the medical profession: they did not desire to be doctors, but simply tinkers, humble lay helpers. Medical men had always very kindly received their efforts. In every town in which they had commenced, they had given the greatest aid and assistance; and why? Because a doctor knew he was not ubiquitous; he could not always be on hand, and he welcomed ready aid until he arrived.

"Of all things in the world, he knew of nothing more wretched than to stand helplessly by and see a man bleeding to death, and be unable to do anything to help him. A little knowledge might be a dangerous thing, but if that little knowledge could save that man, instead of their standing helplessly wringing their hands, which would they prefer? A little while ago, a lady who sneered at their Society, and whose child had been burnt, said to a young lady who attended their classes, 'What should you have done?' 'Oh,' said the young lady, 'I should have done so-and-so.' 'Why, that's just what the doctor did,' was the reply." Major Duncan among other instances narrated the case of a gentleman of great wealth, who died from an accidental cut from an axe with which he was trying to cut down a

tree, and whose life might have been saved if any one had known how to press the femoral artery with his thumb. He also mentioned the interest taken by the hands in the dockyard and arsenals where accidents are frequent, and said it was no uncommon thing to see the men practising the teachings of the Society, one of them pretending in the dinner hour that he had his arm or leg broken, and the others to bandage him.

The course of instruction adopted extended over six lectures of one hour each.

1. Objects of the work, giving examples of the consequences of sick or injured persons being improperly handled.

2. Positions of the large arteries and veins in the body, with extemporized contrivances for checking bleeding in different regions.

3. Recognition of fractures; application of splints to fractured limbs; hints as to articles which may be extemporized for splints, as well as pads and bandages.

4. Method of lifting injured persons on to or from stretchers in or out of wagon. Carrying stretchers along level roads, up and down stairs, or over rough ground, fences, etc.

5. Means of extemporizing stretchers from articles generally available, or of adapting carts, carriages or wagons, for the carriage of sick or injured persons.

6. The immediate treatment of suspended animation from drowning, or from black damp, fainting, collapse, shock from injuries, burns, or scalds and poisons.

Such instruction in our midst is much needed, and it is to be hoped will before long be popularized. The late calamity at Sydney Mines showed how old-fashioned remedies still cling about people. When the men who fell in the after-damp were dragged out insensible, the rescuers were actually burying their heads in the coal dust, when they were fortunately stopped by Mr. Brown, and the men were sent out to fresh air. Experience has taught many of the miners' wives to deal with burns, and the art of handling simple fractures is not unknown to many colliers, but facilities for conveying the wounded are wanting, and there is a reluctance to supply them, on the plea that the presence of a stretcher would have a bad effect on the men. But why should an inanimate stretcher have a greater chilling effect than the presence of a medical man (who not only is tolerated but courted,) and who may be said to be an animate suggestion of all the ills that flesh is heir to.

In concluding this, my final report, I may be permitted to point to the Laws accepted and enacted, to the legal definitions of hitherto undefined terms, and to the improvements induced in mining discipline, to the comprehensiveness of the Returns now published, effected during my term of office as of some permanent worth. I also desire to express my acknowledgments for the many courtesies shown me by those with whom I have had official dealings.

I have the honor to be, Sir,
Your obedient servant,

HENRY S. POOLE,
Inspector of Mines.

TO THE HON. SAMUEL CREELMAN,
Commissioner of Public Works and Mines.

LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	Lessee.	Distict.	Area Sq. Miles.	
	COPPER.			
	Antigonish Co.			
2	Ross, Sarah and others		1	
	Colchester Co.			
	Moir, Wm. C. et al	Tatmagouche	$10\frac{1}{2}$	
	LEAD.			
	Halifax Co.			
1	McClure, Charles F.	Gay's River	1	
	IRON.			
	Pictou Co.			
35	Carmichael, John R.	East River	1	
32, 33, 34, 36, 37, 38, 40, 41	Hamilton, John and others	"	9	
39	Hudson, James	"	1	
	Cape Breton Co.			
86	Brookman, S. J. et al	N. side East River	1	
84	Protheroe, Pryse	Cow Bay	1	
	Inverness Co.			
16	Inverness C. I. & R. Co	Whycocomagh	1	

Total area under lease........ .... $26\frac{1}{2}$ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		Antigonish Co.				
1	McKinnon, et al		3			
		Cumberland Co.				
44	Baker, John W		1			
13, 14, 15	Black, C. H. M		3			
21	Blight, James, et al		1			
47	Boston C. M. Co		1		John Moffat	River Hebert
25	Campbell, Alex., et al		1			
32, 34	Campbell, Alex., et al		2			
35, 48, 49, 50	Campbell, Alex		4			
31,33,37,38,40,41,45,46	Campbell, John		8			
12	Cumberland C. M. Co		4			
17	Domville, James		3		E. N. Sharp	St. John, N. B.
	General Mining Association		4			
	Joggins C. M. Association	Joggins	2	working.	B. B. Barnhill *Robert Redpath.*	Joggins.
	Joggins C. M. Co	Cumberland	2			
20	Kirby, Lewis R		1			
18, 19	Livesey, John		2			
5	Lawson C. M. Association	Maccan	1			
42	Macfarlane, Alex		1			
1, 2, 3, 4	New York & Acadia Co	Scotia	4	working.	William Bennett	Maccan.

LIST OF COAL LEASES.—Continued.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
43	Pugwash & Spring Hill R. Co.	....	1			
16	Seaman, Gilbert	....	1			
24	Shannon, S. L............	....	2			
36, 39	Shannon, S. L., (in trust) et al	....	2			
6, 7, 8	Spring Hill Mining Co......	Spring Hill	3	working.	*William Hall*....	Spring Hill.
22, 23, 28, 29, 30	Styles Mining Co., (Limited).	....	5		J. S. Hickman. ...	Amherst.
9	Victoria Coal Mining Co	....	2			
26, 27	Wright, John V...........	....	3			
			64			
		Pictou Co.				
1	Acadia Coal Co............	Fraser	1			
3	" " "	Acadia..........	1	working.	H. S. Poole	Stellarton.
42	" " "	Pictou......	4		*J. Maxwell*	Westville.
23	Allan, Sir Hugh, Kt..	Vale........ ...	3	working.	J. B. Moore.... *John Greener*..	New Glasgow. Vale Colliery.
10	Gray, B. G...............	....	1			
11	Haliburton, R. G.. et al.....	....	1			
	Halifax Company, (Limited).	Albion..........	4		S. Cunard & Co. *James Hudson*.	Halifax. Stellarton.
13, 14	Intercolonial Company......	....	2			
12	" "	Drummond	1	working.	Robert Simpson ..	Westville.
6	Kirby, Lewis R	....	1			

15, 30, 31	Merigomish Company		3			
25	Nova Scotia Company	Black Diamond	4		W. W. White	Westville.
20	Price, D. E., et al		2			
24	Richey, M. H.		1			
			29			
		CAPE BRETON CO.				
3	Archibald, Blowers	Gowrie	1	working.	Archibald & Co.	North Sydney.
2	Archibald, Thos. D	"	1		*Chas. Archibald.*	Cow Bay.
5, 28	Blockhouse Mining Co	Blockhouse	2	working.	R. Belloni	Cow Bay.
29	" " *(sea area)*		1			
72	Brookman, Samuel		1			
76, 77	" S., et al		2			
15	Caledonia C. & R. Co	Caledonia	1	working.	David MacKeen	Caledonia Mines.
31	" *(sea area)*		1			
30	Campbell, Alex		1		T. D. Archibald	North Sydney.
23, 25, 70	Cape Breton Co., (Limited)		3		Edgar S. Stirling	Sydney.
14, 24	" " " "	Schooner Pond	2		"	
49	" " " "	Reserve	1		"	
64, 65, 68	" " " "	Lorway	3		"	
69	" " " "	Emery	1		"	
8, 9	Clyde Coal Mining Co	Ontario	1½	working.	*John Sutherland*	Port Caledonia.
87	Cossitt, Geo. G		1			
	General Mining Association	Bridgeport	2			
	" " "	Sydney	5	working.	Rich'd H. Brown	Sydney Mines.
	" " "	"	12		Cunard & Morrow	Halifax.
27	" " *(sea area)*	"	5		*Richard Wilson*	
	" " "	Lingan	10	working.	*Donald Lynk*	Lingan.
	" " "	"	4			

LIST OF COAL LEASES.—Continued.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
38, 39	Gen'l Mining Ass'n *(sea areas)*	Lingan	10			
10, 21	Gibson, John, et al		2			
4, 12, 16	Glace Bay Mining Co.	Glace Bay	3	working.	E. P. Archbold. *Henry Mitchell.*	Halifax. Little Glace Bay.
75	Henry, W. A.		1			
22	Ingraham, R. J. & J. L.	Halfway	1			
6, 13, 18, 19	International C. & R. Co	International	4	working.	Dodd & Gillies. *Patrick Neville.*	Sydney. Bridgeport.
71	Jennings, Edward		1			
47	LeCras & McInnes		1			
66	Merchant's Bank of Canada	Gardener	2			
74	Moore & Mosely		$1\frac{1}{4}$			
81	Morton, Lemuel J		1			
80	McDonald, James		1			
52, 53	McLeod, Hugh		2			
83, 85	Protheroe, Pryse		2			
73, 82	Reid, Thos. S., *(sea area)*		2			
40, 41, 42	Ross, H. E., et al.		3			
79	Ross, W. J., et al. *(sea area)*		1			
43	South Head Coal Co	South Head	1			
32	Sword, Wm., *(sea area)*		3			
54 to 63	Sydney, C. M. Co., *(sea areas)*		10			
46	Todd, A. Thornton	Collins	1	working.	S. N. Robinson. *George Scott.*	North Sydney. Little Bras d'Or.
67	Weatherbe & Kirby		1			
78	Weatherbe, R. L., *(sea area)*		5			
34, 35, 36	Victoria C. M. Co., "	Victoria	5	working.	W. Routledge.	Low Point.

50, 51	Victoria C. M. Co.		2			
			$127\frac{3}{4}$			
		INVERNESS CO.				
5	Aylmer, John Evans Freke	Cape Mabou	2			
8	Evans, Thomas	Chimney Corner	1	working.	Robert Wilson	Chimney Corner.
9	Evans, Thomas, *(sea area)*		1			
7, 12	Inverness C. I. & R. Co		2	working.	Alex. Wright	Broad Cove.
13	Murray, George	Port Hood	3		John P. Lawson	Port Hood.
4	Richey, M. H., et al		1			
11	Ross, W. J	Broad Cove	1			
6	Ross, H. E., et al, *(sea area)*.		1			
14, 15	Smyth, Peter		2			
10	Tremain, E. D. *(sea area)*		1			
			15			
		RICH OND CO.				
2	Marmaud, A. E	Little Riv	1			
		VICTORIA CO.				
2	Campbell, Chas. J	New Campbellton.	3	working.	John Macdonald	N. Campbellton.
3, 4, 5	Ross, William	Black Rock	5			
			8			

Total area under lease $247\frac{3}{4}$ square miles.

COAL TRADE BY COUNTIES.

TABLE A.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter	18,035	16,157	63,614	40,333	29,113	8,973	399	53	111,161	65,516
2nd Quarter	28,275	27,066	75,222	63,033	94,685	83,374	663	456	198,845	173,929
3rd Quarter	31,695	28,525	91,252	104,620	144,452	137,579	204	555	267,603	271,279
4th Quarter	35,868	33,121	85,307	80,417	71,806	69,129	13	120	192,994	182,787
Total	113,873	104,869	315,395	288,403	340,056	299,055	1,279	1,184	770,603	693,511
1877	107,004	99,078	306,477	284,155	340,416	301,981	3,599	1,851	757,496	687,065
1876	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,646	634,207
1875	64,797	60,944	382,662	337,102	328,425	304,702	5,281	4,047	781,165	706,795

COAL TRADE BY COUNTIES.

TABLE B.

Markets.	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales	13,977	6,525	56,021	59,424	1,560	5,288	61	....	71,619	71,237	142,856
Sea-borne	....	....	54,960	5,228	73,895	2,650	583	....	129,438	7,878	137,316
Nova Scotia—Total	13,977	6,525	110,981	64,652	75,455	7,938	644	....	201,057	79,115	279,172
Quebec	....	....	55,301	201	27,813	395	....	....	83,114	596	83,710
New Brunswick	70,144	14,100	7,149	1,854	21,592	50	356	....	99,241	16,004	115,245
Newfoundland	....	....	465	99	60,573	161	63	....	61,101	260	61,361
P. E. Island	....	....	13,773	22,356	5,870	1,292	121	....	19,764	23,648	43,412
United States	123	....	5,651	600	70,816	11,305	....	....	76,590	11,905	88,495
West Indies	....	....	4,798	....	12,201	....	....	....	16,999	....	16,999
S. America	....	....	523	....	....	....	....	....	523	....	523
Europe	....	....	....	....	3,594	....	....	....	3,594	....	3,594
Total	84,244	20,625	198,641	89,762	277,914	21,141	1,184	....	561,983	131,528	693,511
1877	81,644	17,434	211,707	72,448	282,710	19,271	1,849	2	577,910	109,155	687,065
1876	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207
1875	50,015	10,929	280,551	56,551	287,257	17,445	4.047	....	621,870	84,925	706,795

COAL—SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1878.	1877.
Nova Scotia.						
Land Sales ...	37,568	30,972	29,816	44,500	142,856	109,955
Sea-borne ...	8,310	28,971	53,633	46,402	137,316	145,835
N. Scotia—Total	45,878	59,943	83,449	90,902	279,172	255,790
Quebec	....	23,613	50,386	9,711	83,710	95,118
New Brunswick	13,734	29,233	40,001	32,277	115,245	104,818
Newfoundland. .	680	16,516	20,580	23,585	61,361	49,342
P. E. Island......	....	8,953	22,323	12,136	43,412	45,169
United States...	4,954	30,977	47,504	5,060	88,495	118,216
West Indies . . .	270	4,124	4,382	8,223	16,999	13,660
S. America	....	....	....	523	523	573
Europe	....	570	2,654	370	3,594	4,379
Total.	65,516	173,929	271,279	182,787	693,511	687,065
1877.	47,843	146,079	290,789	202,354	687,065	687,065
1876.	32,607	161,788	260,250	179,562	634,207	634,207

COAL—GENERAL STATEMENT.

1878.	Produce.	Sales.	Colliery Consumption.
1st. Quarter..........................Tons...	111,161	65,516	23,933
2nd Quarter .... " ...	198,845	173,929	21,101
3rd Quarter .... " ...	267,603	271,279	19,159
4th Quarter .... " ...	192,994	182,787	24,434
Total.	770,603	693,511	88,627
1877.	757,495	687,065	98,841
1876.	709,646	634,207	113,788
1875.	781,165	706,795	124,110

NOTE.—Stocks on hand at the end of the year, 20,307 Tons.

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31ST, 1878.

Collieries.	Seams.	Produce.	Sales.				Colliery Consumption.		
			Bearing Royalty.	Free.	Total.	Per Centage.	Engines.	Workmen.	Per Centage
Cumberland County.									
Chiegnecto.	....	100	100	40	140	......	....	....	......
Joggins.	Joggins Main	11,896	8,857	783	9,640	81	800	100	7
Scotia	North Seam	1,256	882	177	1,059	84	100	....	8
Spring Hill.	Black	100,621	74,405	19,625	94,030	93	4,518	1,695	6
Pictou County.									
Acadia.	Acadia	57,105	41,050	13,617	54,667	95	1,005	1,373	4
Albion Mines	Main	139,424	64,797	57,320	122,117	87	13,017	3,588	12
Intercolonial	Acadia	59,211	44,660	7,578	52,238	88	2,066	1,227	5
Nova Scotia	Acadia	5,160	3,863	993	4,856	94	1,460	319	34
Vale	McBean	54,495	44,271	10,254	54,525	100	2,632	989	6
Cape Breton County.									
Block-house	Block-house	60,770	53,844	2,915	56,759	93	1,800	1,691	5
Caledonia	Phelan	17,348	15,009	4,063	19,072	109	508	540	6
Collins	Collins	4,408	2,432	438	2,870	65	2,510	885	77
Emery	Emery	222	....	....	....	......	210	12	100
Gardener	Lorway	....	....	....	....	......	600	200	......
Glace Bay	Harbor	18,806	19,949	480	20,429	108	3,157	1,126	22
Gowrie	McAulay	33,093	24,977	5,979	30,956	93	1,239	2,440	11
International	Harbor	13,723	13,545	803	14,348	104	2,990	1,475	32
Lingan	Lingan	15,210	10,429	1,098	11,527	76	2,792	888	24
Ontario	Phelan	19,815	18,203	628	18,831	95	262	572	4
Reserve.	Phelan	9,282	6,480	867	7,347	79	1,268	470	18
Schooner Pond	Ross	....	....	3	3	......	272	6	......
Sydney Mines	Main	135,188	102,800	3,566	106,366	78	16,366	5,580	15
Victoria	Ross	12,191	10,246	301	10,547	86	2,550	820	27
Inverness County.									
Broad Cove	....	601	564	....	564	94	....	23	4
Chimney Corner	....	110	80	....	80	72	....	....	......
Port Hood	....	30	22	....	22	73	32	11	......
Victoria County.									
New Cambellton	....	538	518	....	518	94	165	278	65
		770,603	561,983	131,528	693,511	89	62,319	26,308	11

Statement of the Number and Classes of Persons employed, and average Results at each Colliery, during the year ended December, 31, 1878.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of days per person		Average No. of tons per Cutter.	Average tons day day, per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers.	Boys.	Days Labor.	Mechanics.	Laborers.	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Days Labor.	Under-ground.	Surface.				Above.	Below.	Days.
Chignecto	4			264		2		136			6	400	66	68	25					
Joggins	29	5	7	8,560	10	9	3	5,268	2	66	65	13,894	208	239	410	2.	58	4	4	203
Scotia	6	1	1	1,023		2	1	490			11	1,513	128	163	209					
Spring Hill	152	57	41	57,362	26	52	12	20,653	7	1247	347	79,262	229	229	662	2.9	451	4	12	223
Acadia	84	15	15	24,505	27	48	2	21,662			191	46,167	215	281	680	3.8	323	13	4	177
Albion Mines	229	32	70	77,754	30	111	35	49,146			507	126,900	235	279	609	2.5	566	18	31	246
Intercolonial	74	34	24	23,303	24	32	6	18,077	13	2,480	207	43,860	169	292	800	5.3	392	8	3	151
Nova Scotia	10	7	3	2,993	2	8	3	3,404			33	6,397	149	261	516	3.7	38	2		137
Vale	96	24	8	30,394	26	25	5	15,419			184	45,813	237	275	568	3.9	376	5	7	145
Block House	89	11	49	22,757	24	29	4	14,209			206	36,966	152	249	705	6.1	528	11	36	115
Caledonia	34	4	8	6,353	12	14	3	5,856			75	12,209	138	202	510	4.8	163	8	6	106
Collins	17	8	9	6,161	3	16	3	5,116	5	575	61	11,852	181	232	259	1.9	40	2	3	136
Emery	3	10	3	527	3	3		592			22	1,119	33	99	74				1	
Glace Bay	47	2	10	7,431	23	12	4	9,339			98	16,770	126	240	400	3.6	123	6	5	153
Gowrie	74	8	26	13,026	8	26	12	7,377			154	20,403	120	160	447	4.1	306	5	21	108
International	54	7	9	6,113	9	10	2	3,581			91	9,694	88	170	254	3.4	188	2	8	73
Lingan	37	6	12	7,416	6	22	8	6,731	5	132	96	14,279	135	187	411	3.8	143	6	7	106
Ontario	39	9	3	9,613	9	22	3	6,936			85	16,549	188	204	508	2.6	102	4	3	193
Reserve	21		3	3,978	3	4	3	2,210			34	6,188	165	221	442	3.6	75	3	2	123
Sydney Mines	213	27	64	67,991	63	88	39	51,406	33	8,039	527	127,436	223	271	634	2.5	540	11	30	250
Victoria	24	8	6	11,595	17	7	4	10,775			66	22,370	302	384	508	2.	97	1	2	125
Broad Cove	2			415	2	2	1	322	7	505	14	1,242	207	64	301			1		
Chimney Corner	7	3		122	1		1	58	11	202	23	382	12	29	16	1.	7	1		16
Port Hood	3			60	1			37			4	97	20	37	10			1		
New Campbellton	14	1	4	1,014	3	4	2	1,074			28	2,088	53	118	38	1.3	19	3		28
	1,362	279	375	390,730	332	548	156	259,874	83	13,246	3,135	663,850	194	251	566	4.	274	119	185	141

COLLIERY CONSTRUCTION ACCOUNT, 1878.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Colliery. Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospect'g.	TOTAL.
CUMBERLAND CO.											
Chiegnecto			340.00				40.00				380,00
Joggins		1153.50		1,410.00	125.00						2,688.50
Scotia			100.00								100.00
Spring Hill				3,500.00	600.00	2,400.00	500.00	340.00		203.75	7,543.75
PICTOU CO.											
Acadia				4,476.13	939.75					8,122.56	13,538.44
Albion Mines				56.87							56.87
Intercolonial			492.79	227.09			125.70	1,345.45	1,838.14		4,029.17
Vale		750.00		1,500.00						308.00	2,558.00
CAPE BRETON CO.											
Collins	72.25	42.46	102.13	552.26	279.45		389.20		580.46		4,018.21
Gowrie			398.00								398.00
Lingan			1075.75		438 31						1,514.06
Ontario		101.00	631.60	900.00	15.00		800.00				2,447.60
Sydney Mines	1931.25			253.80	66.84		1,998.02	858.43	1,530.83		6,639.17
INVERNESS CO.											
Broad Cove			583.10			690.80	371.60		390.72	6.60	2,042.82
Chimney Corner			250.00		160.00						410.00
VICTORIA CO.											
New Campbellton			500.00								500.00
	$2,003.50	$2,046.96	$4,473.37	$12,876.15	$2.624.35	$3.090.80	$4,224.52	$2,543.88	$4,340.15	$8,640.91	$46,864.59

COAL SALES in Nova Scotia from 1785 to 1878 (Inclusive.)

Year.	Sales.	Total.
1785	1,668	
1786	2,000	
1787 to 1790	10,681	
		14,349
1791	2,670	
1792	2,143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	
		51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	
		70,452
1811	8,516	
1812	9,570	
1813	9,744	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	
		91,527
1821	11,388	
1822	7,512	
1823 to 1825	27,000	
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	
		140,820

Year.	Sales.	Total.
1831	37,170	
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145,962	
1840	101,198	
		839,981
1841	148,298	
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	
		1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	
		2,998,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576,935	
1865	635,586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	
		4,927,339
1871	596,418	
1872	785,914	
1873	881,106	
1874	749,127	
1875	706,795	
1876	634,207	
1877	697,065	
1878	693,511	
		5,734,143
	Total......	15,803,286

SUMMARY.

1775 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1878	5,734,143

Nova Scotia exported to the United States.

COAL.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1866	404,252	$1.25
1851	116,274	"	1867	338,492	"
1852	87,542	"	1868	228,132	"
1853	120,764	"	1869	257,485	"
1854	139,125	Free.	1870	168,180	"
1855	103,222	"	1871	165,431	"
1856	126,152	"	1872	154,092	.75
1857	123,335	"	1873	264,760	"
1858	186,743	"	1874	138,335	"
1859	122,720	"	1875	89,746	"
1860	149,289	"	1876	71,634	"
1861	204,457	"	1877	118,216	"
1862	192,612	"	1878	88,495	"
1863	282,775	"			
1864	347,594	"			
1865	465,194	"			

NOTE.—The quantities given for the Years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably underestimated. At least, the figures given by the Board of Trade for the year 1873, the only year available for comparison with the comprehensive tables now published by this Department, are 12 per cent. below those given in the above table.—H. S. P.

GOLD.

GENERAL STATEMENT FOR THE YEAR 1878.

Shewing the number of Mines at work, days labour performed, quantity of Quartz, &c., crushed, yield of Gold, &c., &c., for the Twelve months ended December 31st.

DISTRICTS.	Number of Mines.	Days Labour.	Mills employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at $18.00 per oz.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou	6	9,188	3	3	....	929	1	2	2	2	13	12	1,026	12	16	$2.01
Gay's River	2	3,620	4	4	....	1,126	....	4	7	....	10	12	243	11	16	1.21
Montagu	2	2,065	3	3	....	192	....	16	12	3	6	17	158	6	12	1.37
Oldham	3	10,599	2	1	1	1,808	....	19	5	9	8	20	1,737	9	9	2.95
Renfrew	1	1,769	1	....	1	380	....	8	5	1	16	....	155	17	10	1.58
Sherbrooke	15	50,827	7	4	3	9,340	....	14	17	5	2	17	6,843	1	15	2.42
Stormont	1	3,015	....	....	....	74	1	8	19	1	14	11	106	10	....	0.64
Tangier	4	10,146	3	1	2	1,035	....	11	7	4	2	18	584	10	22	1.03
Uniacke	4	5,711	2	2	....	704	....	17	21	6	2	9	629	5	7	1.98
Waverley	3	6,727	2	1	1	1,197	....	8	8	1	9	....	498	12	8	1.33
Wine Harbor	2	4,471	2	1	1	814	....	12	2	8	13	14	492	13	12	1.98
Unproclaimed, &c	2	2,284	2	....	2	391	....	5	3	....	9	7	100	10	15	.79
	45	110,422	31	20	11	17,990	....	13	23	9	8	20	12,577	1	22	$2.05

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

Month.	Caribou. No. Mines.	Caribou. Days Labour.	Caribou. Men.	Caribou. Tons.	Caribou. Oz.	Caribou. Dwt.	Caribou. Gr.	Gay's River. No. Mines.	Gay's River. Days Labour.	Gay's River. Men.	Gay's River. Tons.	Gay's River. Oz.	Gay's River. Dwt.	Gay's River. Gr.	Montagu. No. Mines.	Montagu. Days Labour.	Montagu. Men.	Montagu. Tons.	Montagu. Oz.	Montagu. Dwt.	Montagu. Gr.
January	4	188	7	51	39	7	4	1	226	9	45	22	18	7	2	246	9	10	2	15	14
February	5	316	12	108	81	3	20	1	240	9	125	30	6	2	3	289	11	19	9	2	22
March	6	249	10	56	45	6	18	1	326	12	75	15	10	18	2	166	6	8	3	17	...
April	7	792	30	40	25	2	12	2	327	13	60	19	6	17	3	125	5	35	44	15	6
May	7	926	36	40	60	16	10	2	287	11	86	22	0	23	3	236	9	19	17	12	...
June	6	977	38	77	94	6	19	1	239	9	60	13	17	19	3	438	17	50	42	13	...
July	6	972	37	114	117	15	18	3	356	14	170	13	10	6	1	125	5	12	7	10	18
August	6	1,019	39	78	139	9	8	3	419	16	241	24	13	23	3	156	6	8	22	5	12
September ...	6	804	31	87	104	10	1	3	362	14	135	25	15	3	3	143	6	.....	.....	...	...
October	7	947	36	91	116	17	8	3	277	10	49	23	15	4	1	40	2	27	5	9	...
November	7	1,108	43	74	94	17	17	3	282	14	47	18	17	1	2	67	3	4	2	5	12
December	6	890	34	113	106	19	1	3	279	11	33	12	19	13	1	34	1	.....	.....	...	...
	6	9,188	....	929	1,026	12	16	2	3,620	....	1,126	243	11	16	2	2,065	....	192	158	6	12

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued).

Month.	Oldham.							Renfrew.							Sherbrooke.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January	3	511	20	46	11	15	10	1	310	12	33	20	...	...	15	4,221	162	746	648	14	12
February	3	169	6	65	50	4	18	1	305	11	38	18	9	...	13	3,960	152	428	493	10	12
March	3	679	26	65	311	13	6	1	145	12	22	13	14	...	13	4,012	154	799	778	10	12
April	2	725	28	*231	‖ 174	8	5	1	154	6	21	12	13	...	12	3,744	144	527	468	19	...
May.	3	865	33	†173	¶ 285	16	3	1	105	4	9	11	14	...	12	4,212	162	835	641	10	...
June	3	892	34	‡245	**236	18	2	1	92	4	12	5	16	...	12	4,200	161	1,109	641	14	6
July	3	1,194	46	136	45	9	18	1	131	5	28	5	11	...	16	4,860	187	405	401	9	9
August	4	1,156	44	101	150	8	7	1	138	5	34	9	9	22	18	4,806	184	506	448	1	...
September ...	4	1,529	59	§199	††105	5	...	1	203	8	36	22	2	...	18	4,832	186	990	663	5	4
October......	3	971	37	81	74	2	...	..	......	....	.....	.....	...	...	16	4,735	182	758	473	2	22
November. ...	3	988	38	277	166	16	20	1	100	4	23	6	11	4	18	3,614	139	1,168	669	16	12
December	2	920	35	189	124	11	16	1	86	3	124	29	17	8	18	3,640	140	1,069	514	7	22
	3	10,599	....	1,808	1,737	9	9	1	1,769	....	380	155	17	10	15	50,827	....	9,340	6,843	1	15

*138 tons Slate. †75 tons do. ‡ 125 tons do. § 147 tons do. ‖ 26 oz. 4 dwt. from Slate. ¶ 19 oz. from do. ** 24 oz. 10 dwt. from do. ††22 oz. from do.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued).

Month.	Stormont.							Tangier.							Uniacke.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January	1	287	11	.....	.....	...	...	4	745	29	57	7	19	...	2	440	17	63	52	7	17
February	1	287	11	.....	.....	...	...	5	819	31	.....	.....	...	...	4	442	17	40	36	16	7
March	1	288	11	.....	.....	...	...	5	882	38	128	87	9	...	3	311	12	44	19	2	...
April	1	293	11	.....	.....	...	...	5	765	29	44	23	16	...	3	94	4	12	20	1	...
May	1	293	11	38	65	10	...	4	881	34	81	54	13	2	3	583	22	53	56	2	18
June	1	293	11	.....	.....	...	...	3	858	37	105	88	6	1	5	499	19	83	56	3	13
July	1	297	11	.....	.....	...	...	4	504	19	20	28	5	10*	7	857	33	118	59	18	...
August	1	297	11	.....	.....	...	...	5	1,267	49	20	36	11	10†	5	597	23	48	27	18	...
September	1	298	11	.....	.....	...	...	3	1,228	47	.....	4	3	4‡	4	562	22	74	138	13	...
October	..	......	....	36	41	...	...	3	673	26	100	53	5	...	3	371	14	67	62	9	...
November	2	152	6	.....	.....	...	...	3	696	27	41	36	4	6	4	208	8	33	37	18	...
December	2	230	9	.....	.....	...	...	3	828	32	439	163	18	13	6	747	29	69	61	16	...
	1	3,015	....	74	106	10	...	4	10,146	....	1,035	584	10	22	4	5,711	....	704	629	5	7

* 3.18.0 from Specimens. † 9.9.10 from Plates. ‡ From Plates and Specimens.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued).

Month.	Waverley.							Wine Harbor.							Unclaimee, &c.						
	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. Mines.	Days Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January	4	397	15	107	40	11	...	1	172	7	65	32	6	...	1	114	4	.....	.....	...	...
February......	4	405	16	83	40	6	...	1	184	7	7	9	10	...	2	180	7	61	11	13	8
March	4	748	29	87	37	16	...	1	143	5	47	28	2	...	2	424	16	118	19	...	...
April	2	550	21	108	51	13	...	1	153	6	86	46	6	...	3	675	26	†104	4	13	15
May.	4	661	25	83	36	9	10	1	252	10	43	40	...	...	3	426	5	11	47	15	9
June	5	590	23	98	*44	16	16	1	336	13	68	50	13	12	4	145	4	37	1	10	18
July.	3	663	26	100	41	13	6	2	464	18	72	38	7	...	3	145	1	4	1	12	14
August	3	556	21	106	46	12	...	2	665	25	99	57	5	...	1	1	1	3	.....	12	20
September ...	4	471	18	115	44	16	...	2	602	23	113	61	1	...	1	13	1	.....	.....	...	...
October......	3	607	23	124	42	15	...	3	656	25	159	66	16	...	1	39	2	16	2	16	11
November. ...	1	599	23	95	39	8	...	2	232	9	23	6	14	...	2	100	4	31	9	7	4
December....	2	480	18	91	31	16	...	3	612	23	32	55	13	...	1	22	1	6	1	8	12
	3	6,727	....	1,197	498	12	8	2	4,471	....	814	492	13	12	2	2,284	....	391	100	10	15

* 3 oz. 1 dwt. from Plates.

† Sand and Gravel.

GOLD.

GENERAL ANNUAL SUMMARY.

Year.	Total ounces of Gold extracted			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A Day.	A Year.
1862	7,275			6,473	1	2	11	156,000	$ .83	$249
1863	14,001	14	17	17,002		16	11	273,624	.92	276
1864	20,022	18	13	21,434		18	16	252.720	1.42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2.15	645
1866	25,204	13	2	32,161		15	2	211.796	2.14	642
1867	27,314	11	11	31,386		17	9	218,894	2.24	672
1868	20,541	6	10	32,262		12	17	241,462	1.53	459
1869	17,868	0	19	35,147		10	4	210,938	1.52	456
1870	19,866	5	5	30,829		12	21	173,680	2.05	615
1871	19,227	7	4	30,791		12	11	162.994	2.12	636
1872	13,094	17	6	17,093		15	7	112,476	2.09	627
1873	11,852	7	19	17,708		13	9	93,470	2.28	684
1874	9,140	13	9	13,844		13	5	77,246	2.12	636
1875	11,208	14	19	14,810		15	4	91,698	2.20	660
1876	12,038	13	18	15,490		15	13	111,304	1.94	582
1877	16,882	6	1	17,369		19	10	123,565	2.46	738
1878	12,577	1	22	17,990		13	23	110.422	2.05	615
	283.570	16	15	376,212				2.835.255		

DISTRICT SUMMARY.

CARIBOU.

Year.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	$1.62
1870	613	11	2	755		16	6	6,500	1.88	1.64
1871	504	15	23	479	1	1	1	2,964	3.40	3.06
1872	209	15	0	368		11	9	2,184	1.92	1.72
1873	17	16	12	21		16	23	312	1.14	1.02
1874	368	10	23	333	1	2	3	4,651	1.58	1.42
1875	446	12	19	368	1	4	6	3,675	2.45	2.18
1876	727	4	10	542	1	6	11	6,000	2.39	2.15
1877	2,596	13	23	1,735	1	9	21	14,579	3.56	3.20
1878	1,026	12	16	929	1	2	2	9,188	2.23	2.01

MONTAGU.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1863	366	14	16	140	2	16	2	38,688	.18	$0.16
1864	1,052	19	14	545	1	18	15	11,492	1.83	1.64
1865	902	12	23	615	1	9	8	12,376	1.45	1.30
1866	496	15	10	382	1	6	0	6,032	1.64	1.47
1867	436	15	16	244	1	15	11	7,826	1.11	.99
1868	584	14	22	350	1	13	0	7,384	1.58	1.42
1869	805	13	14	572	1	8	3	8,944	1.80	1.62
1870	3,831	9	5	916	4	3	14	15,106	5.06	4.55
1871	3,152	8	15	848	3	14	8	15,938	3.95	3.55
1872	1,793	10	6	683	2	12	12	13,832	2.59	2.33
1873	1,440	3	9	679	2	2	9	10,972	3.62	2.35
1874	655	0	22	496	1	6	10	5,452	2.40	2.16
1875	287	18	17	72	3	19	23	2,526	2.27	2.05
1876	149	1	17	81	1	16	19	1,404	2.83	2.38
1877	50	1	9	55		18	5	1,405	.71	.64
1878	158	6	12	192		16	12	2,065	1.53	1.37

OLDHAM.

1862	51	0	0	84		12	3	4,368	.23	$0.20
1863	1,223	3	21	1,026	1	4	6	25,896	.94	.84
1864	1,750	5	12	2,238		15	11	37,934	.94	.84
1865	1,126	11	20	2,236		10	1	18,278	1.23	1.10
1866	956	12	20	966		19	19	11,362	1.68	1.51
1867	1,100	3	14	870	1	5	7	15,418	1.42	1.27
1868	719	0	4	1,012		14	4	8,008	1.79	1.61
1869	1,394	16	0	1,735		16	1	17,576	1.58	1.42
1870	2,051	15	3	2,644		15	12	20,254	2.02	1.81
1871	1,718	12	12	1,374	1	4	4	13,494	2.54	2.28
1872	1,014	11	10	793	1	5	14	8,580	2.36	2.12
1873	998	2	17	662	1	10	3	6,994	2.85	2.46
1874	665	8	11	527	1	5	6	3,420	3.86	3.27
1875	915	8	3	550	1	13	6	6,100	3.00	2.70
1876	1,953	5	23	1,705	1	2	21	15,757	2.47	2.22
1877	2,527	19	13	2,015	1	5	2	14,144	3.57	3.21
1878	1,737	9	9	1,808		19	5	10,599	3.27	2.95

RENFREW.

Year.	Total ounces of Gold extracted.			Quartz crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz,	Dwt.	Gr.		Dwt.	
1862	308	8	0	171	1	15	10	10,920	.56	$0.50
1863	785	7	7	575	1	7	7	21,216	.74	.66
1864	1,172	6	5	1,229		19	1	12,220	1.91	1.71
1865	1,008	10	18	927	1	1	18	14,430	1.39	1.25
1866	6,423	15	11	6,003	1	1	9	38,142	3.36	3.02
1867	7,904	19	2	7,222	1	2	4	61,308	2.57	2.31
1868	3,373	14	9	5,994		11	6	39,598	1.70	1.53
1869	3,097	15	7	7,258		8	12	34,606	1.79	1.61
1870	1,171	18	11	3,243		7	2	11,310	2.07	1.86
1871	1,179	17	16	2,463		9	4	10,972	2.15	1.93
1872	323	3	8	855		7	13	5,668	1.14	1.02
1873	59	16	18	255		4	16	2,028	.59	.53
1874	3	3	7	10		6	7	190	.33	.29
1875	47	16	6	113		8	11	690	1.38	1.24
1876	75	14	10	164		9	5	1,307	1.15	1.03
1877	207	13	4	294		14	3	3,543	1.17	1.05
1878	155	17	10	380		8	5	1,769	1.76	1.58

SHERBROOKE.

1862	2,023	0	0	663	3	1	0	22,464	1.80	$1.62
1863	3,304	14	12	3,454		19	8	31,200	2.11	1.89
1864	3,419	14	20	2,673	1	6	8	32.630	2.09	1.88
1865	3,424	1	21	2,511	1	7	6	23,010	2.97	2.67
1866	5,829	13	8	2,853	2	0	20	22,490	5.18	4.66
1867	9,463	18	0	7,378	1	5	15	35.958	5.31	4.78
1868	7,070	0	5	9,880		14	7	59,540	2.37	2.13
1869	5,546	11	16	11.500		9	15	41,964	2.64	2.37
1870	7,134	4	0	11,428		12	11	48,880	2.91	2.61
1871	6,579	19	7	13,882		9	9	50,856	2.58	2.32
1872	4,188	9	21	5,243		15	17	38,246	2.21	1.98
1873	5,026	0	4	7,187		15	9	31,460	3·19	2.87
1874	4,037	1	2	5,430		14	20	31,199	2.58	2.32
1875	5,818	15	10	6 443		18	1	38,683	3.00	2.70
1876	5,176	15	15	6,205		16	16	37,269	2.77	2.49
1877	8.237	3	10	8,654		19	1	47,725	3.45	3.10
1878	6,843	1	15	9.340		14	17	50,827	2.69	2.42

STORMONT.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts. at $0.90.	
	Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.		Dwt.	
1862	397	0	0	197	2	0	7	12,792	.62	$ .55
1863	1,587	13	12	526	3	0	7	15,600	2.03	1.82
1864	1,510	4	21	636	2	7	11	25,844	1.16	1.04
1865	1,696	6	2	1,040	1	12	14	25,350	1.29	1.16
1866	1,254	17	9	2,253		11	2	11,208	2.23	2.00
1867	1,266	16	15	782	1	11	3	12,428	2.03	1.82
1868	673	2	17	596	1	2	14	14,560	.92	.82
1869	227	0	13	590		7	16	6,110	.74	.66
1870	578	5	15	1,525		7	13	6,552	1.76	1.58
1871	559	7	21	1,937		5	18	5,590	2.00	1.80
1872	472	0	11	543		17	9	4,316	2.18	1.96
1873	37	18	5	181		4	4	832	.91	.81
1874	167	19	20	236		14	5	1,799	1.86	1.67
1875	267	6	18	620		8	14	2,543	2.10	1.89
1876	267	0	5	370		14	10	3,607	1.48	1.33
1877	240	19	0	96	2	10	4	3,310	1.45	1.30
1878	106	10	0	74	1	8	19	3,015	.71	.64

TANGIER.

1862	865	0	0	707	1	4	11	39,000	.44	$ .39
1863	494	7	21	655		15	2	37,440	.26	.23
1864	602	7	8	698		18	10	16,380	.74	.66
1865	644	7	13	639	1	0	4	13,156	.97	.87
1866	296	5	21	791		7	11	9,074	.65	.58
1867	691	14	7	724		19	2	6,864	2.01	1.80
1868	921	8	9	725	1	4	7	11,700	1.57	1.35
1869	1,192	3	10	1,332		17	21	15,938	1.49	1.34
1870	1,814	2	10	2,732		13	6	29,328	1.23	1.11
1871	2,093	0	7	2,924		14	7	27,326	1.53	1.38
1872	829	8	15	1,622		10	5	10,426	1.59	1.43
1873	726	11	15	1,070		13	4	8,892	1.63	1.46
1874	419	7	5	706		11	21	5,092	1.64	1.47
1875	448	2	15	1,106		8	1	6,667	1.34	1.21
1876	312	13	0	716		10	6	8,274	.92	.82
1877	410	14	15	364	1	2	13	5,102	1.61	1.42
1878	584	10	22	1,035		11	7	10,146	1.15	1.03

UNIACKE.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1866	72	16	9	28	2	12	0	1,326	1.09	$0.98
1867	1,622	13	20	1,968		16	12	14,274	2.27	2.04
1868	3,247	3	17	3,874		16	16	27,898	2.32	2.08
1869	1,867	3	12	3,172		11	18	22,022	1.69	1.52
1870	566	14	5	1,794		6	7	6,214	1.82	1.63
1871	360	17	3	900		8	0	4,342	1.66	1.49
1872	241	10	0	364		13	7	1,950	2.47	2.22
1873	129	8	18	198		13	1	1,222	2.52	2.26
1874	14	1	0	19		14	19	60	4.68	3.81
1875	139	3	3	319		8	17	2,643	1.05	.94
1876	227	14	10	321		14	4	4,752	.96	.86
1877	663	15	9	470	1	8	6	7,252	1.83	1.64
1878	629	5	7	704		17	21	5,711	2.20	1.98

WAVERLEY.

1862	1,507	0	0	3,741		8	1	46,800	.66	$0.59
1863	2,380	6	3	6,755		7	1	58,344	.81	.72
1864	6,410	4	22	9,238		13	23	88,244	1.44	1.29
1865	14,404	4	9	12,518	1	3	0	87,308	3.29	2.96
1866	8,612	17	11	16,750		10	6	98,800	1.74	1.56
1867	3,942	5	2	10,510		7	12	46,436	1.69	1.52
1868	2,387	8	22	6,372		7	11	36,972	1.26	1.13
1869	1,591	14	10	3,915		8	3	16,796	1.89	1.70
1870	811	3	21	2,619		6	4	13,546	1.19	1.07
1871	1,427	18	12	2,772		10	6	17,472	1.62	1.45
1872	1,047	17	0	1,761		11	21	12,766	1.64	1.47
1873	1,009	0	0	2,013		10	0	13,520	1.49	1.34
1874	1,553	12	15	1,682		18	11	12,541	2.47	2.22
1875	1,740	1	0	1,313	1	6	12	18,807	1.85	1.66
1876	1,539	7	0	1,661		18	12	21,107	1.45	1.30
1877	866	18	10	1,422		12	4	14,261	1.21	1.09
1878	498	12	8	1,197		8	8	6,727	1.48	1.33

WINE HARBOR.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr,	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1862	1,688	0	0	835	2	0	10	12,792	2.63	$2.36
1863	3,718	2	19	3,644	1	0	10	36,688	2.02	1.81
1864	4,033	3	7	4,136		19	12	22,984	3.50	3.15
1865	2,200	5	14	3,833		11	11	16,588	2.65	2.38
1866	1,012	8	4	1,881		10	18	8,814	2.29	2.06
1867	845	18	14	1,670		10	3	13,390	1.26	1.13
1868	1,248	6	3	2,938		8	12	23,166	1.00	.90
1869	719	8	19	2,726		5	6	20,462	.70	.63
1870	914	15	14	2,356		7	17	8,034	2.27	2.04
1871	1,538	6	16	2,927		10	4	11,232	2.74	2.46
1872	2,572	10	18	2,305	1	2	7	8,840	5.82	5.23
1873	2,000	0	3	2,267		17	15	12,688	3.15	2.83
1874	633	11	6	1,193		10	14	5,605	2.26	2.03
1875	492	11	22	1,140		8	15	3,942	2.49	2.24
1876	1,217	19	7	1,929		12	15	7,848	3.10	2.79
1877	580	14	3	1,068		10	21	5,772	2.01	1.80
1878	492	13	12	814		12	2	4,471	2.20	1.98

OTHER DISTRICTS.

1862	436	0	0	75	5	19	10	6,864	1.26	$1.13
1863	141	3	2	225		12	13	6,552	.43	.38
1864	66	12	0	38	1	15	0	4,992	.27	.24
1865	47	3	8	102		9	6	2,470	.38	.34
1866	248	10	19	250		19	23	4,550	1.09	.98
1867	39	6	17	16	2	9	3	4,992	.15	.13
1868	316	6	22	518		12	5	12,636	.50	.45
1869	424	12	15	761		11	3	15,444	.54	.48
1870	378	5	15	812		9	7	7,956	.95	.85
1871	112	2	16	281		8	0	2,808	.79	.71
1872	402	0	13	2,552		3	3	5,668	1.41	1.26
1873	407	9	13	3,175		2	13	4,550	1.79	1.61
1874	622	16	18	3,212		3	21	7,327	1.70	1.53
1875	604	18	2	2,766		4	9	5,422	2.23	2.00
1876	331	17	17	1,796		3	14	3,978	1.67	1.50
1877	499	13	1	1,196		8	8	6,473	1.54	1.39
1878	344	2	7	1,517		4	13	5,904	1.16	1.04

Statement of Coals (in tons) received at the several Stations from Mines in Nova Scotia for the year ending 31st Dec., 1878.

STATIONS.	QUANTITY.	STATIONS.	QUANTITY.
Halifax	20,842	Bro't forward	180,478
Bedford	146		
Windsor Junction	2,422	Sussex	378
Enfield	268	Apohaqui	30
Elmsdale	62	Norton	24
Milford	36	Passekeag	28
Shubenacadie	332	Hampton	416
Stewiacke	178	Rothesay	214
Brookfield	40	Cold Brook	342
Truro	3,776	Saint John	6,050
Valley	22	Chatham	12
Glengarry	18	Bathurst	54
Hopewell	116	New Mills	12
Stellarton	10	Charlo	6
New Glasgow	2,142	Campbellton	32
Pictou Landing	84,128	Rimouski	10
Debert	72	Riviere du Loup	6
Londonderry	40,270	Three-mile House	426
Wentworth	12	Four-mile House	72
Greenville	20	Malcolm's Siding	350
Thompson	40	Rocky Lake	66
Oxford	268	Oakfield	30
Spring Hill	10	Moir's Siding	20
Athol	18	Miller's Siding	6
Maccan	30	Logan's Siding	20
Amherst	1,408	Waterloo	6
Aulac	76	Crowson's Siding	42
Sackville	790	Isgonish	6
Dorchester	18,266	Folly Lake	20
Memramcook	144	Jones' Siding	6
Shediac	54	Boundary Creek	18
Point du Chene	24	Nappan	48
Moncton	1,350	Culhoun's	6
Salisbury	2,746	Brookville	60
Petitcodiac	294	Little Forks	6
Penobsquis	48	Fort Lawrence	18
Carried forward	180,478	Total	189,318

INTERCOLONIAL RAILWAY.

Statement shewing the quantities in tons of the different kinds of Coal received from various Mines for the use of the Intercolonial Railway during the year 1878.

Months.	Albion Mines.			Vale.	Drummond.	Spring Hill.
	Round.	Small.	Coke.	Round.	Round.	Round.
January	2,606	60	......	......	....	5,728
February	2,014	116	......	......	....	1,642
March	1,648	40	......	......	....	3,257
April	1,520	70	20	......	....	3,222
May	1,550	111	10	435	....	5,280
June	978	......	......	2,174	....	3,662
July	38	78	......	1,715	180	4,438
August	......	140	10	1,297	792	4,856
September	......	483	10	819	757	4,389
October	......	226	......	......	1,678	5,934
November	......	11	......	......	2,315	8,050
December	......	11	10	......	2,258	7,115
	10,354	1,346	60	6,440	7,980	57,573

(Signed) D. Pottinger.

General Storekeeper's Office,
Moncton, N. B., 5th Febuary, 1879.

COALS Forwarded from the following Stations:		COKE Forwarded by Albion:	
STATIONS.	Quantity.	STATIONS.	Quantity—Tons.
New Glasgow.......	47,452	Halifax	60
Stellarton	61,348	Truro	20
Spring Hill.........	35,326	Stewiacke........	20
Albion	25,998	Londonderry......	12,320
Drummond	18,994		
Maccan	200		
Total......	189,318	Total......	12,420

E. & O. E. MONCTON, N. B., 4th February, 1879.

(Sd.) J. J. WALLACE, *Auditor.*

IRON MINING.

Iron Ore....36,600 tons. Workmen employed underground....123
Ankerite.... 3,102 " on the surface... 22

39,702 tons. Total....145

MANGANESE MINING.

No. 1. Quality of Ore....79 tons @ $55 per ton. Average number
No. 2. " " ....48 " @ $45 " of workmen, 14

127 tons.

GYPSUM QUARRIES.

Windsor......47,496 tons.
Cheverie......28,603 "
Maitland ..... 3,270 "
Walton ...... 2,610 "
Hantsport .... 942 "
Wallace ...... 80 "

Total....83,001 " Valued at $71,635.

MOULDING SAND.

Windsor......555 tons. $555.

BUILDING SMONE.

Wallace......3,175 tons. $11,390.
" Rubble Stone—619 tons.

FINANCIAL STATEMENT. — GOLD.

Mines Department for Twelve Months ended December 31st, 1878.

DISTRICTS.	RECEIPTS.			EXPENDITURE.				
	Rents.	Royalty.	Totals.	Return of Rents.	Return of Royalty.	Royalty Commission.	Salaries Surveyors, &c.	Totals.
Caribou	$126.00	$428.40	$554.40	....	$108.58	$33.32	....	$141.90
Fifteen Mile Stream	....	20.87	20,87	....	....	....	....	....
Gay's River	6.00	108.98	114.98	....	....	4.31	....	4.31
Lawrencetown	....	8.18	8.18	....	....	.20	....	.20
Montagu	100.00	51.05	151.05	....	....	....	....	....
Oldham	44.00	606.66	650.66	$4.00	....	23.92	....	27.92
Ovens	8.00	....	8.00	....	....	....	....	....
Renfrew	12.00	48.84	60.84	2.00	....	3.64	....	5.64
Sherbrooke	110.00	2,528.24	2,638.24	....	....	130.04	$720.00	850.04
Stormont	14.00	....	14.00	....	....	....	27.50	27.50
Tangier	2.00	155.91	157.91	....	....	6.47	....	6.47
Uniacke	38.00	271.73	309.73	....	....	9.24	....	9.24
Unproclaimed	20.00	....	20.00	....	....	....	....	....
Wagamatcook	2.00	....	2.00	....	....	....	....	....
Waverley	....	185.10	185.10	....	....	9.59	....	9.59
Wine Harbor	6.00	146.07	152.07	....	....	7.17	....	7.17
Prospecting Licenses	....	....	476.38	....	....	....	(Return)	9.75
	$488.00	$4,560.03	$5,524.41	$6.00	$108.58	$227.90	$747.50	$1,099.73

OTHER THAN GOLD.

Mines Department for Twelve months ended December 31st, 1878.

COUNTIES.	RECEIPTS.				EXPENDITURE.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licences to Search.	Return Licenses to Work.	Totals.
Antigonish	$140.00	$50.00	....	$190.00	....	....	....
Cape Breton	540.00	375.00	$19,892.31	20,807.31	$40.00	$50.00	$90.00
Colchester	120.00	....	....	120.00	....	....	....
Cumberland	200.00	75.00	7,051.17	7.326.17	....	....	....
Guysborough	20.00	....	....	20.00	20.00	....	20.00
Hants	40.00	....	....	40.00	....	....	....
Inverness	120.00	....	....	120.00	....	....	....
Kings	20.00	....	....	20.00	....	....	....
Lunenburg	20.00	....	....	20.00	....	....	....
Pictou	140.00	75.00	15,926.42	16,131.42	....	....	....
Richmond	20.00	50.00	....	70.00	....	....	....
Victoria	40.00	....	....	40.00	....	....	....
	$1,420.00	$625.00	$42,859.90	$44,904.00	$60.00	$50.00	$110.00

ABSTRACT ACCOUNT.

RECEIPTS AND EXPENDITURE *for the Twelve months ended December 31st, 1878.*

RECEIPTS.			EXPENDITURE.		
Licenses to Search Coal	$1,420.00		Return Licenses to Search Coal....	$60.00	
" Work "	625.00		" " Work "	50.00	
Royalty	42,859.90				$110.00
		$44,904.90			
Rents ....Gold........	488.00		Return Rents..............Gold..	6.00	
Royalty .... "	4,560.03		" Royalty........... " ..	108.58	
Prospecting Licences "	476.38		" Prospecting Licenses " ..	9.75	
			Royalty Commission....... " ..	227.90	
		5,524.41	Salaries and Surveys....... " ..	747.50	
					1,099.73
			General Expenses	5,383.47	
			Postage	70.24	
			Stationery......................	143.01	
					5,596.72
	$50,429.31	$50,429.31		$6,806.45	$6,806.45

REPORT

OF THE

DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1879.

HALIFAX, N. S.:
ROBERT T. MURRAY, QUEEN'S PRINTER,
1880.

CONTENTS.

DEPARTMENT OF MINES.

REPORT

FOR THE YEAR 1879.

To His Honor the Honorable ADAMS GEORGE ARCHIBALD, *C. M. G.,*
Lieut.-Governor of the Province of Nova Scotia, &c., &c., &c.

MAY IT PLEASE YOUR HONOR:—

I respectfully present herewith to YOUR HONOR the Annual Report of the Inspector of Mines, together with statistical information, compiled from official and other returns made to the Department of Mines, for the year 1879.

SAML. CREELMAN,
Commissioner of Public Works and Mines.

Halifax, March 1st, 1880.

REPORT

ON THE

MINES OF NOVA SCOTIA,

FOR THE YEAR ENDING 31ST DEC., 1879.

BY EDWIN GILPIN, JR., A. M., F. G. S., *Member of the Newcastle Institute of Mining Engineers, Mining Engineer, and Chemical Analyst.*

OFFICE OF INSPECTOR OF MINES,
Halifax, Feb. 26th, 1880.

THE HONORABLE
SAMUEL CREELMAN,
Commissioner of Public Works and Mines:

SIR,—I beg leave to submit the following Report on the various Mining industries of the Province, carried on during the past year.

In addition to a detailed notice of the operations at each mine during the year, and the usual statistical tables, a summary is given of the amount of minerals exported, which do not pay Royalty to the Government of the Province.

In accordance with the custom followed in late Reports of this Office, I venture to append a few remarks on Mining improvements and appliances adopted in other countries, in the hope that some of them may, on reflection, appear to warrant a trial here.

During the present keen competition for markets throughout the world, especially in the Coal Trade, every labor and time-saving economy is required, especially by those conducting Mining operations under climatic and other conditions less favorable than with those in the neighboring States.

The following summary shows, as far as I have been able to learn, the extent of the Mineral production of Nova Scotia during 1879:—

Gold	Ounces....	13,801
Iron Ore	Tons.	29,889
Manganese Ore	"	145
Coal Raised	"	*788,273
Coke Made	"	9,646
†Gypsum	"	95,126
† Building Stone	"	5,562
† Barytes	"	480
‡ Limestone	"	9,444
Fireclay	"	50
Grind-stones, Etc	"	1,675

Through the kindness of the Collectors of Customs, at the Ports specified, I give further details under this head.

* Ton of 2,240 lbs.
† Quantities shipped, amounts used in Nova Scotia, unknown.
‡ For Iron Smelting.

COAL TRADE.

The total sales for the year 1879, amount to 688,624 tons, being a decrease over the sales of 1878, of 4,883 tons.

The sales of Round Coal, however, are 12,923 tons in excess of those of 1878, which would make the value of the Coal sales this year, at least equal to those of the preceding one.

The most noticeable points in the trade were, the increase in the sales to Quebec and Ontario, the amounts sold in these Provinces in 1879, being 154,118 tons, against 83,710 tons in 1878.

The shipments to New Brunswick, have decreased slightly. The sales in Newfoundland and Prince Edward Island are about the same as in the preceding year.

The amount sold in the United States, was 51,641, the smallest sales recorded since 1850.

The sales to the West Indies fell off from 16,999 tons, in 1878, to 10,124 tons, in 1879.

CUMBERLAND COUNTY.

The total trade of this County amounted to 90,671 tons against 104,869 tons in 1878. This decrease would perhaps not have appeared but for an unavoidable suspension of work owing to a disagreement with the workmen at Spring Hill, lasting 5 weeks; the trade with New Brunswick also declined.

COLLIERIES.

Joggins.—The new slope has been sunk during the past year to a depth of 200 feet, and levels turned East and West. A counter balance has been made on each side of the slope, and bords driven in some distance, leaving a twenty-feet pillar next the railway level. The pillar working in the second level to the east of the slope has been finally abandoned.

Scotia.—A few tons were mined for local sale, and the faces of the level slightly extended.

Chignecto.—At this Colliery, the level started in the fall of 1878 has been continued to about 700 feet, and bords turned to the full rise. At present the level has 70 feet of cover, which will increase to 160 in a short distance.

The coal is now carefully hand-picked, and its reputation is good, as a strong lasting house coal, in Amherst and neighboring villages.

The tramway has been put in order as far as Maccan Station, and

several cars built; a few tons have been shipped over the Intercolonial Railway to Amherst, etc.

The Collieries in this section of the District will be in a good position to share in any brighter prospects of trade, as they are at no great distance from suitable loading places at Sackville and Dorchester, and are the nearest by rail to Quebec and Ontario.

STYLES.—A few tons were taken out as samples during the past year, and it is proposed to continue the level during the present winter. The coal is found well adapted for house use, and from its appearance should also be suitable for gas purposes.

SPRING HILL.—The acquisition of the four square mile area of the General Mining Association of London, which covered the extension to the dip of the seams worked by the Spring Hill Co., has added greatly to the value of this property.

In the main or north seam the extraction of the bord and panel pillars, in the Eastern workings, has been continued. The Western railway level has been re-opened through the broken and carried into the newly acquired territory. It has been driven of a good size and well timbered in view of the extensive winning before it.

In the South seam the levels have been continued, and four counterbalances driven. The pillars in the second balance in the East side are being removed.

A Telephone has been put up to connect the engine-house and the bottom of the slope, and has proved very serviceable. A stationary fire-engine has been built at the mine, and placed beside the fitting shop. A screen has been built suitable for loading the box cars used on the Intercolonial Railway.

A little prospecting was done on the Black and adjoining areas, confirmatory of previous explorations, and at one or two other points, about which I have no information.

PICTOU COUNTY.

GENERAL REMARKS.

The trade of this County has increased during the past year, the returns showing that 330,878 tons of coal were sold, an increase of 42,475 tons over the sales of 1878.

This production would have been still larger but for two causes, the temporary stoppage of the Londonderry Blast Furnace, and the strike at the Drummond Colliery in December.

The most notable feature in the trade of the County has been the increase of sales to Quebec and Ontario, from 55,501 tons in 1878 to 103,217 tons in 1879.

COLLIERIES.

ACADIA.—The operations of extracting the pillars from the lower levels have been satisfactorily continued; the necessary precautions being taken of lamps, shot-firers, and the use of the wedge in the bords nearest to the old grove.

The new winning has been driven down to give a lift of about 300 feet of coal.

The water and railway levels have been driven east and west about 600 feet, and counterbalances turned away. In order to keep the pillars between the levels of as regular a shape as possible, on account of the increasing weight, the horse roads are driven at a heavier angle than usual, and the horse's load lightened by the adoption of a counterbalance system. The amount of air passing in the lowest level, in October, was 18,000 feet. The coal from this seam is carefully prepared, and the stove size finds a ready sale. A feed-water heater, on the principal of Wright's patent, has been satisfactorily used. A connection has been made with the railway of the Nova Scotia Colliery, and the plant and wharf of the latter Company have been utilized for shipping coal at Middle River.

ALBION.—In the main seam operations have been continued to the rise in the south and north sides of the pit. The dip slants have been continued and open up a large extent of coal. The north slant is now approaching the north level, which will be found beneficial in ventilation and carriage of coal to the shaft.

The amount of air passed by the fan in May was 65,660 cubic feet.

The water from the old workings has been almost exhausted, and the large pump now raises the water from both main and deep seams.

It is proposed to introduce locomotives driven by compressed air to do do the underground haulage on the levels; the air to be supplied from reservoirs filled by compressors placed at bank.

The following analyses made, during the past year, at the works of the Gas Light and Coke Company, of London, will show that the coal from the new winnings of this seam is of very excellent gas quality. No. 1 refers to the North Side Dip Slant, and No. 2 refers to the South side Dip Slant. An average of three trials gave:—

No. 1.........10,300 cubic feet of gas per ton, 2,240lbs.
" 2.........10,450 " " " "

Illuminating power equal to fifteen candles.

The yield of coke being:—

No. 1.....................14 cwt. 1 qr. 2 lbs. per ton.
" 2.....................14 " 2 " 7 " "

DEEP SEAM.—The work in the winning in this seam from the Ford pit tunnel has been discontinued for the present. Operations have been resumed in the dip workings, which have been pushed north and south; a balance of eight bords being worked n the south side. The cylinder of the underground engine has

been replaced by one 24 inches in diameter, and the road carefully graded, so that a daily extraction of 500 tons can be reached. The coal in the lowest level has increased to 14 feet in height. At bank scales have been put up, and the coal is paid for by weight. The total sales from these Mines was 112,441 tons.

Since writing the above, I learn that the Halifax Co. purpose erecting at once a pair of 36 inch steam cylinders compressing, with a 6 foot stroke in 40 inch cylinders, air, to a pressure of 40 lbs.—which is conveyed underground in pipes to drive two pairs of 12 inch engines, arranged to haul coal from the north and south dip slants of the Ford pit. The steam for the compressor will be furnished by multi-tubular boilers. The introduction of compressed air is a novelty in our coal mining, and its application will doubtless be watched with much interest. A new locomotive also has been ordered from Black, Hawthorn & Co.

INTERCOLONIAL.—The pillars on the upper level, next the western boundary, were brought back, and the lower levels driven nearly to the line; and the extraction of pillars commenced. The lower levels going east are being rapidly pushed, and precautions taken against gas, and two new balances driven.

The fault to the south has been cut by a pair of incline drifts, and the preparatory work of winning out is being pushed.

An exploratory bord is being driven to test the quality of a small block of coal lying next the fault, which will be taken out if found satisfactory.

NOVA SCOTIA.—There has been no coal mined at this Colliery. As already mentioned, the rolling stock and wharf were utilized by the Acadia Company.

VALE.—During the past season the slopes for the new winning have been driven 530 feet to the dip, and the levels turned north and south. The coal is found to preserve its thickness of 7 feet, and remains free from any partings. The wide work and extraction of pillars has been regularly continued during the year on the upper and lower levels on each side of the pit.

The west furnace has been rebuilt and made 9 feet wide, and 20 feet has been added to the stack, giving a heated air column of 110 feet.

A small winding engine, of the following dimensions, has been erected to facilitate the sinking of the slopes and ultimately to draw the coal on the levels, viz:—Two 10 inch cylinders, geared to drive two 4 feet 6 inch drums. The engine is very compact, occupying a space 7 feet 9 inches long, by 9 feet 6 inches wide, and 5 feet high. The bed plates are of cast iron, having the crank and drum shaft bearings cast on; the cylinders and drums are placed between them. The drums are fitted with clutches, and the full set of levers so arranged that they can all be handled without change of position by the driver.

The pumping is done by a Blake pump recently erected, having an 8 inch cylinder, 12 inch stroke, double-acting 5 inch plunger, working against a pressure of 155 lbs. per square inch.

CAPE BRETON COUNTY.

The sales of coal from this County are 36,128 tons less than last year.

The sales to Quebec, have increased materially, while the sales to the United States have fallen off 46,077 tons.

COLLIERIES.

Sydney.—The new winnings have got fully in working order, and the completeness of the arrangements at bank and underground, may be inferred from the raising of 932 tons in one working day, which, I believe, is the largest amount yet recorded from a single pit in the Province. The north and south planes are now working, and the extraction of coal has begun in accordance with the plans laid down at the inception of the workings. The bords on the south level have also been worked during the summer.

The ventilating fan, of the Guibal pattern, now in course of erection, is 30 feet in diameter, and 10 feet wide. Its engine has one horizontal cylinder, 24 inches in diameter, and a 24 inch stroke.

The under-ground engine on the north side of the pit, has two horizontal cylinders, 15 inches diameter, and a 30 inch stroke; the one on the south side has two horizontal cylinders, 16 inches diameter, and 24 inch stroke.

The introduction of a mechanical ventilator, the first in Cape Breton, will, it is hoped, lead to their more extended adoption in this district.

Lingan.—New bords have been started on the south No. 2 level, and pillars have been removed on the same side.

The air circulating in July was 20,000 cubic feet per minute.

A new pump has been set up to take the surface water from No. 2 level, and that raised by a Cameron pump from No. 4 level, and to discharge it at bank, or into the shore adit. The following are the dimensions of the pump, which was built at the Sydney Mines:—

Steam cylinder, 15 inches; water cylinder, 6 inches, 24 inch stroke, driven by 24 lbs. of steam from boilers at bank, 824 feet distant. During the summer the channel to the loading shoots was deepened by dredging.

Victoria.—No mining operations have been conducted at this colliery during the past year.

Collins.—Operations have been suspended at this colliery also during the past year.

Reserve.—This is the only colliery of the Cape Breton Company that has been worked during the past season. About 40 men were

employed in driving bords in No. 4 levels on the north and south side, and also in No. 3 level, north. The workings were aired by four splits, giving with scales, about 18,000 cubic feet. During the summer the coal was shipped from Sydney; in the fall the Louisburg Pier (also belonging to the same Company) was fitted for shipping, and several cargoes loaded.

International.—The works of the pit both above and below ground received extensive repairs. The inclines, levels and travelling roads, were re-timbered when necessary. The heapstead, and rolling stock and pier, were also put in order. The bords to the south of the dip slant levels, and on the north side levels, were extended. It is proposed to put a dam in the old shore levels at a point where they are in stone, in order to prevent any possible influx of sea water flowing into the dip works.

Little Glace Bay.—The operations of the past year have been continued, and the coal is found to maintain its quality, that on the south side being a little tender and requiring spragging. The rise drifts were continued, to hit the dip slants of the Harbor pit level, and were holed through in the autumn. The ventilation is maintained by the exhaust steam from the pump, and amounted at the time of my visit, to 2,400 cubic feet per minute. It is expected during the coming season that a Dominion dredge will be employed to deepen the harbor and approaches.

Caledonia.—The operations at this colliery have not been extensive. The coal required was obtained by operations similar to those of the previous year. On the surface, several repairs have been performed, and new boilers have been set up in place of two old ones which have been taken out.

Ontario.—The operations of the preceding year were continued to the south on the lower level, and have advanced about 200 feet. Nineteen bords were in course of working in July, and were aired by about 4,500 cubic feet of air from natural ventilation.

Block House.—The coal mined has been taken chiefly from the pillars; a few bords have been driven toward the outcrop on the northern edge of the basin. The coal passes directly from the working places to the ships, and is weighed on the wharf in rakes of eight boxes—the men being paid by measurement. A loaded cellular breastwork of squared timber has been carried along part of the seaward face of the loading wharf.

During the summer the amount of air passing was found to be 12,600 cubic feet.

Gowrie.—The bords and workings of the preceding year were continued to meet the demand. It is to be hoped that the prospects of the coal trade will soon warrant the utilisation of the fine shaft and winding gear of the new or western winning.

The amount of air circulating was found to be 6,900 cubic feet.

Gardiner.—All mining operations have been suspended at this Colliery during the past year.

OTHER LOCALTIES.

Broad Cove.—A small portable engine of 10 horse-power has been set up, and an incline started which cuts the former levels obliquely. A screen has been put up and new tubs provided. The facilities at the dam have been improved to permit of scows being loaded at all tides. It has been again proposed to open McIsaac's pond on the same property, which would afford a safe loading place.

Port Hood.—Since the boiler explosion, no steps have been taken toward re-opening beyond replacing the destroyed boilers by a new set of similar pattern.

New Campbellton.—A counter balance has been driven in the south side. The north level has been enlarged for a horse road, a system of long wall adopted which is said to answer well, and to produce better coal at a lower cost. The adit has been continued across the slope to the face of the north workings; the surface water has been cut off by it, and the lower workings are kept dry by a few hours' pumping per week. From the return made by the Agent, the ventilation during the fall was 10,000 cubic feet.

Prospecting was carried on during the fall in a lease adjoining the Broad Cove Mines, and an adit driven a short distance on the Big or 12 foot seam.

GOLD MINING.

GENERAL REMARKS.

The total yield of Gold during 1879 was 13,501 ozs. 8 dwts. 10 grs. against 12,557 ozs. 1 dwt· 22 grs. in 1878.

The yield per ton has also averaged 4 dwt. higher than in the preceding year from a lessened tonnage of quartz crushed. The yield per man has been $2.34 per day. The tribute system has been continued with its evils unabated. The uncovered shafts, which abound in many of the Districts, have been frequently complained of. I have generally found those engaged in permanent work willing to keep them protected, but this necessary precaution is often avoided by the tributors, who seldom remain long at one place.

DISTRICTS.

CARRIBOU.—Mining has been almost at a standstill in this District during the past summer. A few small lots were taken out by tributors on the free claim and other places. It is to be hoped that on the decision of an important law suit connected with the district, mining will soon be more vigorously prosecuted.

MOOSE RIVER.—Operations were conducted at this point in some cases with fair returns—a lot of 29 tons, from area 27, giving 32 oz. 19 dwt., and 135 tons from area 173, yielding 137 oz. 9 dwt. 13 grs.

This district, though yielding some very rich boulders and otherwise promising well, has not come np to the expectations of those interested. The depth of the soil and the presence of swampy ground cause much delay and expense in prospecting.

FIFTEEN MILE STREAM.—A considerable amount of prospecting was done here during the summer. The Halls opened a curiously contorted lead believed to yield at the rate of about 2 oz. Promising leads were reported to have been found on the properties of Messrs. Hudson and Greener. Both the crushers are out of repair, but preparations are being made to repair the Pictou mill.

GAY'S RIVER.—But little work was done here during the past year. Messrs. Wilson & Corbil were the chief parties mining. They put up a small battery at the old dam, and continued the works on the south of the brook.

LAWRENCETOWN.—Mr. Crook did a little work on his areas near the bridge, and crushed a few tons of trial quartz from Chezzetcook.

MONTAGU.—This locality affords another instance of the fluctuations attending the various gold districts of the Province. Mention has been made in previous Reports of promising boulders of rose-colored quartz, which were supposed to have come from a very rich lead in the eastern part of the district. Several attempts have been made to trace these boulders to their source, but unsuccessfully until this spring, when Mr. G. Stuart and his associates succeeded in finding the lead. It has since been successfully worked, having yielded from 127 tons, 675 oz., 17 dwt., 8 grains. It has been sold to a party of American gentlemen for $50,000, and operations are to be vigorously prosecuted during the winter.

On the Symonds property a lead has been opened to the west of the mill, which has yielded well at the junction of numerous cross leads which intersect it—one crushing of 50 tons from area 1361, having given 147 oz.

Mr. Sutherland reports having discovered the same lode about 800 feet to the eastward, where it shows gold estimated at ½ oz. to the ton; and search was made for a rich cross-vein.

A few parcels of quartz were taken from the Temple and other properties, but systematic work was confined to the first mentioned properties.

WAVERLY.—But little has been done in this district during the past year. In the spring the barrel quartz was sunk to on area No. 113, but was not found profitable. On the west side the Wilder, Brook, and Johnstone lodes were tested.

On the Buckner property Mr. T. J. Wallace was engaged in refitting the old water mill; a new flume was built. Two 4 stamp batteries were put up, and the old wheel and other machinery utilized. He tested a number of lodes, and re-opened the mine on the lake shore, but I am not aware of permanent operations being initiated.

OLDHAM.—A few tons of rich quartz were taken from the barrels of the north Wallace lode where it crosses the main road.

Mr. Baker worked on the north load, at the apex of the turn, stoping the south, and on cross veins coming in on the face of the dip. During the summer a large quantity of dump was picked, washed and crushed, and yielded 3 to 4 dwt.

Mr. Donaldson discontinued his winter and spring work on the Britannia lode, and turned his attention to the Hall lode on the north range, which promised well on area 358, and yielded 215 oz. 6 dwts. from 22 tons. Work was also done on leaders from the Britannia lode, and on the Stirling area, on the Frankfort lead.

RENFREW.—This district has made small returns. Work on the Hay lead was discontinued.

Mr. Haydon re-opened the Preeper lode close to the brook, but later on he opened the Old Time lead, west of the split, and stoped from a shaft 60 feet deep.

A few men were engaged during the summer in taking out blocks of quartz left near the crop of various old workings. The unusual scarcity of water impeded work very much during the season.

SHERBROOKE.—The output from this district was 7,389 ozs. against 6,848 ozs. in 1878, the yield from 9,209 tons averaging 16 dwt. 1 gr. as compared with 14 dwts. 17 grs. in 1878.

The workings of the Wellington Company on the Dewar lode were 440 feet deep in the new west shaft, and four stopes carried about 150 feet to the west.

On the middle lode the west shaft was sunk 100 feet, and three stopes carried to the west.

A new lode was found about 45 feet south of the old Wellington which gave 5 dwts. on trial, and a shaft was sunk on the south lode.

On the adjoining property Mr. Williams continued the operations of last year to the westward.

Tribute work was carried on in the Hayden & Derby, Gladstone, Chicago, New York and other properties with varying success.

On the Wentworth area, Mr. Hattie worked on the big lode, and took a large amount of gold from a small side lode, 1½ to 2 inches thick. On the Caledonia area, work was carried on by McNab and others on the same lode, of which 5½ tons gave 42 ozs. 10 dwts.

Messrs. Bent & Fraser worked successfully on the Dominion area, and stoped out the width of 7 feet to a depth of 70 feet, and purpose working the same lode in the adjoining area to the west.

At Cochran's Hill work was carried on by Mr. Cumminger in the slate belts near the high road. About 8 feet of slate holding 6 lodes was being mined at the time of my visit. At Campbell's mine, several lodes were tested, and a belt near the crest of the hill was worked to some extent, about 3 feet of whin and slate were taken out holding a 2 inch and two smaller lodes. The average yield was about 7 dwts.

STORMONT.—Work was carried on only by Mr. Gallagher, on the north lode, by sinking shafts about 80 feet apart and stoping to the west. The quartz raised was crushed at Sherbrooke, and yielded fairly.

TANGIER.—At Mooseland work was done on the Irving lode, and two hundred feet of stoping carried to the west, from a 50 feet shaft; work was also done at other points.

At Tangier Mr. Townsend continued his operations at Strawberry Hill; a pump, driven by the mill engine, was put in a shaft on the Forrest lode, about 300 feet west of the Mooseland road, and was expected to drain about 1,200 feet of the lode. The Dunbrack lode was worked from the Ward shaft and other points. Blocks were also taken out of the Wallace lode.

Messrs. Barton & Murphy worked on the eastern extension of the Nigger and South lodes, and a slate lode to the north, holding 4 small veins. The tunnels driven from the Lake bank cut several lodes, some of which will, it is anticipated, prove profitable to work.

The Leary lead was worked during the winter, and after standing through the spring, was re-worked in the fall, and stopes carried about 75 feet to the east; the quartz maintaining its average yield.

The area holding the Field lode, lying west of Copper Lake, was purchased by Messrs. Torrance and Scaife in the fall, who purpose organizing a Company and to put up a mill on the River.

The Messrs. Ferguson's have worked the Field lode on tribute; a crushing in December, gave 17 dwts.

Uniacke.—Work has not been brisk this summer. On the Uniacke Company's area a shaft was sunk to test a lode 250 feet west of the mill.

On the south lode, a good deal of tributing was done, much of the quartz averaging slightly over one ounce. The nugget lode was worked in the spring, and yielded well for some time.

Wine Harbor.—Work was continued on the Eldorado area. The Hattie lode yielded several good crushings. Work was also done on the Mitchell lead, and consisted chiefly in taking out blocks. The west Cassitt belt was worked to some extent in the fall.

On the Barrens, a little preliminary work was done in lodes that it was considered would yield a margin. Prospecting was done to the north, but not, I believe, giving satisfactory results.

From Ecum Secum, a few tons were taken to Sherbrooke, and gave paying results, but work was not continued.

At Harrigan's Cove a fresh mill license was taken out, and preparations were being made in the fall for resuming work.

Prospecting was done at Gold River and other points along the Eastern Shore, and discoveries of gold were reported from the Cumberland Mountains, Musquodoboit, South Mountain, but no systematic extraction has yet been commenced.

COPPER MINING.

At Eagle Head, Gabarus Bay, in pre-Silurian felsites, a little work has been done on copper pyrites, associated with arsenical pyrites, bismuth glance, iron pyrites, molybdenite and traces of gold, occuring in a band of quartz four feet wide.

Openings were also made on the farm of Angus McDonald, French Road, where copper pyrites occurs in a compact felsite; and on the Gillis Lake Road, where a soap-stone rock of irregular composition holds iron and copper pyrites with green carbonate.

It is stated that Mr. Francis Ellershausen will test the above mentioned deposits during the present winter.

Near Leitches Creek, 12 miles from Sydney, a good deal of prospecting was done, on an exhibit of copper pyrites in strata of laurentian age, consisting of felsites passing into quartzites and hornblendic rocks.*

During the past season operations were carried on for a short time at Polson's Lake, and two shafts sunk about 60 feet, but work was shortly afterwards suspended.

The copper ores of Tatamagouche are still receiving attention, and the new holders of the lease purpose testing them during the ensuing summer.

In King's County, a lead of quartz holding copper ore has been tested to some extent. The prospects are said to be good, and the enterprise of Mr. T. Hale and his friends in thoroughly testing the lode is deserving of every success. The ore consists of gray, vitreous, blue and green carbonates, yielding on assay up to 25 oz. of silver per ton of 2,000 lbs.

Discoveries of copper ore were reported from Musquodoboit, and Cheticamp in Cape Breton, but I am in possession of no details.

* Geo. Sur. 1875-6, p. 374.

IRON MINING

No returns of Iron Mining have been made to the Department except from the works of the Steel Co. of Canada, at Londonderry. Here the operations of extracting ore have been continued at the West Mines, and the opening to the Cumberland Mines completed. The preparatory driving of adits has also been continued.

Work was resumed at the East Mines in September, and has been continued from the upper adit.

New ore and fuel sheds have been erected, and the furnace lift converted from an inclined to a vertical one. The furnace which was put out of blast has been refitted, and the other is now successfully running at the rate of 450 tons a week. The coke ovens have been repaired, and the admixture of raw coal found to work well in the furnace.

The works have been benefitted by the increased duty, and it is to be hoped that the present demand for iron may induce shipments of ores from other localities to the United States, if the proprietors do not see their way to the erection of works.

In reference to the more phosphoric ores of the Province, it may be remarked that they promise to become workable by the Thomas Gilchrist process, as by this method pig iron holding 1.4 Phosphorous and 1.4 of Silicon, and nearly 2.0 Phosphorus and 1.0 of Silicon, has given a satisfactory product in Germany, and the process appears to be considered practically workable in England.

FIRE CLAY.

Some 40,000 brick have been made from a bed of fire-clay, 4 feet thick, overlying the McGregor seam, Pictou Co., on the property of the Halifax Co. The clay is considered by Mr. Jamme to be the best plastic clay he has ever used. It will be a matter of congratulation if, after so many trials, a clay has been found fulfilling the severe requirements of the blast and puddling furnaces.

Attention has been turned to the altered white, weathering, slatey felsites, of the Coxheath Hills, of which the following analysis is by Mr. Hoffman, G. S. R., 1875-6, p. 423:—

Silica	76.260
Alumina	19.152
Fenic Oxide	Trace.
Magnesia	.170
Lime	.552
Soda	.159
Potash	.100
Water	4.300
	100.693

From experiments made by the analyst, and detailed ibid, this material appears suitable for the manufacture of fire-brick.

ACCIDENTS.

During the year 1879, the following fatal accidents occurred:—

1. Feb. 19.—George Chistopher—Laborer, Vale Colliery—Rope broke while riding on loaded tubs in main slope.
2. June 9th.—W. Boutilier,—Collier, Reserve,—Taking down coal loosened by shot.
3. December 9th.—James Ferguson,—Miner, Tangier,—Thawing dynamite improperly.
4. December 24th.—Edward Hall—Driver Boy, Lingan—Horse, drawing empty waggon, ran away.

The following notice of the fatal accident at Tangier is from an account furnished by Mr. J. Fraser Torrance, M. E., who was within a few yards at the time:—

"On Tuesday, December 9th, about 10 a. m., Joseph Ferguson, as blacksmith, was engaged in heating a gad at the forge in the Western shaft house on the Fields Lead. His cousin, Jim Ferguson, the deceased, was inserting a capped fuse in a cartridge of No. 1 dynamite. George Ferguson, Sr., who drove their horse, was also in the building, along with Joe Mason and Mr. Logan, a fisherman. A tin dinner can with three cartridges of partly frozen No. 1 dynamite in it, and supposed to contain hot water, was standing on the forge, not far from the fire. Suddenly the explosion occurred. Jim and Joe Ferguson were hurled in a heap into one corner of the house, and Old George also fell in inside. Joe Mason and Logan declare that they themselves were blown bodily through the doorway of the building on to the dump.

"The shaft house was considerably injured by the explosion, but by no means wrecked. And nobody was injured by falling timbers; in fact none fell.

"The dying man lingered apparently unconscious for about half an hour after he was carried home. His wounds were chiefly in the lower part of the body, and *his hands were but slightly injured*, which proves to my mind most positively that the detonator and cartridge in his hands never exploded.

"The probable cause of the accident was the overheating of the can, and its consequent dryness. Such an accident would be practically impossible with one of the patent warming cans for dynamite. Several other cartridges had been removed from the can less than five minutes before the explosion, otherwise all five men would probably have been instantly annihilated. As it was, it is providential that none of them were blown down the open shaft, at the bottom of which their comrades were working. The Coroner's inquest was held that afternoon, and a verdict was returned, simply to the effect that the deceased came to his death by the accidental explosion of dynamite."—*Mor. Chr.*

The accident at Lingan, December 24th, occurred on the incline from the wharf. The horse drawing up the empty waggons ran away, and the driver, instead of putting on the brake, jumped out. His feet caught in the reins, and he was dragged along the ground for some distance. His injuries were at first considered slight, but proved fatal six days afterwards.

Seven accidents causing injuries more or less serious, were reported as having happened while taking down coal, or from falls of coal and stone in working places.

Taking the average of the last fifteen years, it is found in England that the fatal accidents from this cause form 38.9 per cent. of the total fatal colliery accidents above and below ground.

A colliery manager, of many years experience, recently stated that he had never known a single accident by falls of roof or coal, which was not due, in a great measure, to contributory negligence on the part of the workmen.

The Government Inspector for Yorkshire states that, "men frequently neglect to use the means supplied to them for ensuring their own safety, and prefer to run the risk of injury or death in the endeavor to save time to taking steps to make their working places secure."

In the North of England, where men are specially appointed as "proppers" of the roof, there are but 1.3 lives lost for every 500,000 tons of coal extracted, while in South Wales, where this system is not adopted, the extraction of the same amount of coal was accompanied with a loss of 3·20 lives.

Sir George Elliott stated, in the House of Commons, that the Colliery owners should perform the propping in all districts, and that there would be a greater economy of life and limb by having that urged and insisted upon than by any other measure connected with the Mines' Regulation Act.

Where such a system is adopted, it is but reasonable that the colliers should contribute toward the wages of those men who are employed to enable them to work with increased safety.

By careful timbering, spragging and propping this class of accidents could be reduced at least 50 per cent. To attain such favorable results the collier must contribute his own care and discretion, for it is impossible for any colliery management to watch every working face, with its conditions of shape and safety varying every hour.

Three non-fatal accidents are reported as having occurred from explosives, viz., from returning too soon to a "hang-fire" fuse, unramming a miss-fire; and the third occurred in a stone drift, where the match missed fire. The collier introduced a copper needle to put in another match, when the shot went off, fortunately without inflicting serious injury.

In this connection, the following extract of special rules in force in the Metalliferous Mines district of T. F. Evans, Esq., Inspector of Mines, North Wales, may prove useful:—

"He shall, every time he commences work, or returns to it, after blasting, make a careful examination and remove any loose

ground or rock that may be dangerous. When firing a shot, he shall station himself out of the way, so as to most conveniently warn other persons of the danger. If a shot misses fire, he shall not return to it, or to its neighborhood (except in case of emergency) during that shift, or at soonest, after the lapse of half an hour; and when he does, he shall on no account attempt to reopen the old hole, but shall drill another at a distance of not less than four inches from the old hole, and in such a direction that his drill shall not come in communication with the old charge. If the shot goes off, but fails to do its work, he shall not recharge the hole, nor put powder into any rent made, until after the lapse of 10 minutes."

In this connection the last report of Major Majendie, H. M. S. Chief Inspector of Explosives, contains some information which may be of service to those engaged in mining in this Province.

Out of 28 gunpowder accidents, six appear to have occurred in the process of ramming or unramming a charge. This class of accident is due chiefly to want of care and vigilance on the part of workmen.

Five accidents occured from deterred action of the fuse, and the Inspector states, "We have been led lately to look more closely into the matter, and it is quite evident that very considerable retardations in the action of safety fuse may arise from more than one cause. Thus, a defect in the manufacture, the presence of oil or damp in the powder column, the kinking or semi-fracture of the fuse in storage or handling, are among the causes of "hang fires." Possibly in some cases they may arise from the miner unintentionally igniting only the yarn of the fuse, which smoulders on until the fire reaches the column of powder (the top of which may have been shaken out of the fuse) and action unexpectedly ensues. But in the majority of cases it is more probable that the interruption occurs after the fuse has actually become ignited, and that the smouldering of the fuse at this point produces hang fire. A simple remedy against any evil consequences is a rule forbidding any miner to approach a fuse which has apparently "missed fire" for an interval of at least half an hour.

Out of nineteen dynamite accidents, four occurred through wilful neglect of the instructions given for the proper process of thawing it.

Two accidents were due to the boring of holes in the neighbo-r hood of holes in which dynamite had been deposited a few days previously, and from which the water had caused the nitro-glycerine to exude. The tools used in boring struck the exuded nitro-glycerine and exploded it.

Eight accidents were due to the miner igniting by his tools part of a charge of dynamite which had remained unexploded by a previous blast.

The teaching of these accidents, the Inspector says, is that in no case should boring be permitted in the vicinity of an old hole, until the place has been carefully searched by a competent person. And in the case of wet holes, all boring in the immediate vicinty, except on a higher level, should if possible be prohibited.

VENTILATION.

Many of the collieries are carefully and systematically ventilated; but I would bring to your notice the fact, that at others, there is shown a want of appreciation of the importance of this subject.

Some of those engaged in conducting collieries, appear to reason that, because fire-damp is present merely in traces, a very slight circulation of air is all that is required. The important fact is lost sight of, that the miner should work in an atmosphere representing as nearly as possible the external air, whereby, not only is a larger amount of coal dug for the master, but the health and life of the workman is better maintained. Therefore, it has frequently happened that in a pit giving off gas and requiring a strong current of air, the miner labors in an atmosphere purer than in many mines almost entirely free from gas.

It is frequently the custom to measure the volume of the ventilating current at the intake or the outlet; it is evident that this affords no guarantee of the proper passage of the air through the workings.

In addition, if the air be measured at the outlet, it will be found to have increased in volume by the heat produced by lamps, men, decomposition, and the natural warmth of the strata.

In one instance a furnace was passing a current of some 18,000 feet, while the air in the working places was almost stagnant. After a while, the air was measured at the intake splits and found to be of insignificant volume; further search showed that the furnace drew its air from a hole that had fallen in from the surface, and that only a small proportion of it passed through the works. Had the mine in question been liable to outbursts of gas, the consequences would have been serious.

Almost every coal mine in the Province has two, and many several ranges of working places. The object of ventilation, is to provide for each of these ranges an adequate amount of fresh air, to keep the road ways fresh, and when necessary, to air abandoned districts. The measurement at the outlet alone, affords no information whether these points have been attended to or not. The measurements of the air actually entering each range, of the roadway scales, and of the air intended for the waste, added together, and compared with the total amount of air leaving the mine, corrected for the temperature of the incoming and outgoing air, will show the quantity lost by defective doors and stoppings, which has been known to amount to one-third of the total ventilating current. Measurements of the air, based on the above general principles, will give information on the air of a mine, which, if acted upon, will not only conduce to the safety and comfort of the miner, but also frequently prove an economy.

Such measurements should be made weekly at least; the mining laws of several of the States of the Union, require returns of such measurements to be made once a month to the Inspector. In this connection, the use of mechanical ventilators will be found especially suitable for our comparatively shallow mines, where an upcast shaft of proper length cannot be readily obtained. The fans of the Guibal and similar patterns are rapidly replacing furnaces in England and the Continent, on the grounds of greater safety, convenience and economy.

Thus, makers in England offer selt-contained Guibal fans and engines, F. O. B., at Liverpool, capable of passing 15,000 to 20,-000 cubic feet per minute, for $870; larger ones capable of passing, say 30,000 feet, costing abont $1,100. I would be glad at any time to show plans of fans, etc.

Fire Damp.—During last summer an interesting series of experiments were made, under the auspices of the Midland Institute of Mining Engineers, by Mr. Smethwick, which shows that the Davy lamp cannot be considered absolutely safe where gas is given off in quantities requiring high ventilating velocities; and that under similar circumstances the Clanny lamp proved but little safer. The Mueseler lamp, which is self-extinguishing, was found to give the best results, as its light was the brightest and steadiest combined with ready indication of the presence of gas.

These results are confirmed by the report of the Belgian Commission which states that, "The whole of the experiments prove that no means of lighting can be absolutely safe. As far as the Davy and Porion lamps are concerned, it has been shown from the beginning that they give no kind of security in an explosive mixture of 1.70m. per second. The Mueseler lamp has generally behaved well, but has produced unaccountable explosions," &c.

The progress made in electric lighting warrant us in anticipating that at no distant date a safe and practical light will be available for shaft bottoms, landings, incline heads, &c., but at present it is not clear that it can be introduced into the numerous working faces of a large mine.

An ingenious method of detecting and measuring the fire damp in mines has been proposed by A. H. Maurice, of Staffordshire, viz.: An air-tight vessel is provided with a vacuum gauge, provision is made for introducing into it another air-tight box, holding spongy platinum, which can be opened without admitting air to the larger box. When the box holding the platinum is opened it decomposes the fire damp in the larger box, producing water and carbonic acid, the consequent rarefaction of the air is recorded on the gauge.

The Mallard Chatellier process for detecting gas consists in replacing the oil flame by a hydrogen jet, which burns with great heat but little flame—owing to latter property of the jet, it keeps any explosive gas in the air burning and at the same time the flame elongates. The blue cap is longer than in an oil lamp and is not obscured by the presence of a white flame. The ordinary glass

chimney is replaced by a copper one, which has an aperture fitted with a magnifying glass to observe the flame. From trials by experts it is claimed that .25 of 1 per cent of gas can be detected.

Herr Keorner, of Freiberg, has devised an improvement in miners's safety-lamps, by constructing the same in such a manner that the entire air-supply which feeds the flame is made to pass into a wire-gauge chamber through a filter of pumice-stone, impregnated with platinum black. The action of this device is based on the property of platinum black to condense on its surfaces such combustible gases as light carbureted hydrogen, and effect their slow combustion.

Whatever may be the utility of this lamp for general pit work, it may be found very useful for driving gassy levels, firemen, etc.

Herr Nasse, from experiments, near Saarbruck, deduces the following opinions:—

"That none of his observations could fix a definite pressure, below which, gas effluxed; although in every case gas appeared only with a falling barometer, and any important continued diminution added to the quantity. Therefore, as there is a greater margin for such decrease, the higher the mercury stands, it is evident that practically a high barometer calls for more caution than a low one."

Mr. Greenwell, President of the Newcastle Institute of Mining Engineers, made in his inaugural address in April, 1879, the following remarks, which may be read with profit by gentlemen on this side of the Atlantic, who consider themselves safe from explosions, because fire-damp shows in their workings merely in traces, or as an almost inappreciable ingredient in the air:—

"Those who have examined the workings of collieries after explosions have occurred, cannot fail to have been struck by the following facts which are of frequent occurrence:—

1. The large area affected by the fire, frequently including the general workings to a greater or less extent.
2. The very frequent entire absence of explosive atmosphere in any part of the workings, notwitstanding the derangement of the ventilation.
3. The quantity of charred coal dust that is found covering the props and the floors and wall-sides of the drifts and excavations.

"The above certainly lead us to the conclusion that it was not the actual condition of the mine previous to the explosion as regards fire damp, which was the cause of such a wide-spread fire. What part is performed by coal dust and what part by fire-damp, possibly given off with great rapidity during even the short period of the explosion, is at present hidden from us. That coal dust should suddenly be ignited by flame, distilled into gas, and exploded simultaneously over miles of excavations, is not easy to realize, although it may be capable of ocular demonstration that it will do so in a box; it is a case in which I fear laboratory experiments will fail us. We are by no means absolutely certain as to the temperature at which fire-damp will ignite; we know that coal gas will ignite at a much lower one; but have we considered the result from a distillation at a low temperature of that impalpable dust which we have under our notice? Not gas in its purified state,

but with all of its highly inflammable adjuncts? And not cool, but at the temperature of distillation? Will this fire at a Davy-lamp, not at but under a red heat? Have we thought whether or not the sudden compression (produced by an explosion) of the loaded atmosphere into the *culs-de-sac* of the workings might produce sufficient heat not only to distil the dust but to ignite the product?"

SAFETY VALVE.—The following description of a safety valve recently patented by J. Greener, Esq., Manager of the Vale Colliery, shows that attention is still being given, by those engaged in our mines, to that important problem, safe boiler working:

It consists of a valve chest holding two valves, reversed, one directly over the other, on the same stem, and so arranged that when the lower one is held down in the usual way, a small opening is left between the upper one and its seat. A pipe inserted between the valves leads to the furnace and is so arranged that the fire is damped out by an escape of steam when the upper valve is closed. Should the pressure rise a little above the working pressure, the lower valve opens slightly, not enough to close the upper aperture, and the steam escapes into the air. Should the pressure continue to rise, the lower valve rises more, closes the upper aperture and allows the steam to pass through the pipe into the furnace. The valve lever is similar to that in ordinary use except that it is continued beyond the fulcrum, and has a vertical hole in it. The boiler being fitted with the usual low water indicator weight, it is attached in this instance to a small tube instead of a wire. This tube passes through the hole mentioned and carries a whistle. A hole is cut in the tube, so that when the water falls below the safe working level, the hole comes inside the boiler and allows the steam to escape and sounds the whistle. A stop is placed on the whistle tube so that it strikes the lever when the tube has fallen low enough to allow the whistle to sound. Should the water continue to fall, the indicator weight raises the lever, frees the valve, which rises, closes the upper opening, and the fire is put out by the escape of steam through the pipe above mentioned.

It will appear that a boiler fitted with this valve and alarm can neither be exploded by over-pressure, nor injured by a careless attendant allowing the water to get too low; and the greatest point in its favor is that it requires no more attention than an ordinary safety valve.

SLACK COAL.—In view of the large amount of slack coal that accumulates at many of our mines, especially in Cape Breton, the following notes on what is claimed to be a practically successful method of making compressed fuel may not be misplaced:

The manufacture of briquettes in England amounts annually to about 200,000 tons, and has been confined chiefly to South Wales.

Some time ago trials were made of English artificial fuels by the naval authorities, and they were not considered satisfactory, owing to heavy clinker, quantity of smoke, and high price, exceeding that of round coal, the greatest point in their favor

being their adaptability to stand weather, handling and warm climates.

The cost may be chiefly owing to their being made, as coke formerly was, from selected coal. It is now well known that the best of coke is made from washed slack, and this removes that very important objection.

Trials made of the French artificial fuels showed that they gave better results than Cardiff or Newcastle coal, and are now largely used in the navy and mercantile marine of that country.

The fuel works in connection with the Anniche Mines turn out about 250 tons of briquettes daily, and employ 50 hands.

Briquette machines, such as those of Yeadon & Co., Leeds, capable of turning out 60 tons of fuel per day, cost only £1,600, including Cornish boiler, 2 briquette machines, grinding and mixing pans, elevators and hoist, shafts and drums, etc.

The briquettes are evenly compressed and no pitch or expensive adhesive material is used. The cost of making 36,000 4lb. briquettes, or 60 tons of the above, including 20 p. c. for interest and depreciation, is given at 1s. 6d. per ton of 2,240 lbs.

These machines have lately been introduced into the North of England, and are found to work satisfactorily and to give a product which is coming in demand for steam and house use.

For preparing coal for this purpose as well as for coke making, Hart's Pneumatic Mineral Separator is a step in the right direction. In this machine, air is employed instead of water, and is driven, at the rate of 800 pulsations per minute, through the material to be sorted at a pressure corresponding to the order of separation of the minerals according to their densities. The mass rapidly becomes what may be termed semi-fluid, arranging itself in the order of the densities of the minerals contained. It is thus particularly adapted for coal cleaning where the specific gravities of the impurities do not greatly exceed that of the mineral itself. It further avoids the film of clay which is spread over coal when washed by water, and the slack is dry and ready for sale or the ovens.

Explosives. — During the past year, although no very striking innovations have been made in the various explosives used by the miner, several improvements deserve notice.

In ordinary blasting powder, the experiment has been made of compressing it into cartridges which present the following advantages, viz: saving of weight and bulk, lessened smoke. When used in coal mining a lessened per centage of slack owing, to the action of the powder being slower and more resembling that of a wedge, the holes are more quickly bored and less tamping is required. Trials of this powder in Belgian coal mines are said to show that the better quality of coal produced compensates fully for its increased cost over loose powder.

It is known that gunpowder is frequently found too quick or too slow for purposes required. In order to quicken the action of ordinary gunpowder, Mr. Nobel proposes the admixture of a few per cent. of a powder made of picrate and nitrate of potash.

The Kennal Vale Powder Co. have introduced the ordinary gunpowder compressed into short cylinders with hole in centre. They are strung on fuse, which is cut to required length of charge. These cylinders can be water-proofed, and are said to give quick ignition and less smoke.

The annual reports of the English Inspectors of Explosives contain much valuable information on this subject, and are worthy the perusal of all who are engaged in mining and quarry work.

Interesting experiments have recently been made by the Austrian Government in gelatinous nitro-glycerine. This substance is formed by dissolving glycerine in the latter, and is a gelatinous gummy body which does not part with the nitro-glycerine under the heaviest pressure. It resists water, will not explode from percussion and is with difficulty ignited.

Important qualities are conferred on this explosive by the addition of about 4 per cent. of camphor. It then becomes ignitable only at very high temperatures, is practically unaltered by water, and produces less smoke than dynamite, with a far greater power.

To those engaged in sinking or drifting, who do not wish to use electricity for shot firing, the simultaneous fuse, known as Bickford's, will prove useful. It consists of an ordinary fuse connecting through an explosive disc with any number of instantaneous fuses burning at the rate of 100 feet per minute; thus providing a means of firing shots with almost the same speed and a lessened cost as compared with electricity.

A novel means of breaking down coal has been brought forward by Mr. W. Garford, who has succeeded in compressing air in a portable machine to a pressure of 15,000 lbs. per square inch. This is conveyed to a sheet iron cartridge fitted in a drill hole bored in the coal and there exploded.

Should extended trials prove the applicability of this scheme, a great step will have been gained by doing away with the obnoxious gunpowder fumes.

GOLD MINING.

In connection with the large quantities of metallic compounds in the Nova Scotia leads holding gold, it may not be amiss to note that in Victoria the average yield from pyrites and blanketings during 1877, was 2 oz., 10 dwt., 13 grs., per ton; and during the years 1869-78, 2 oz., 10 dwt., 18 grs. These averages have been maintained since, and several new mills built especially for their treatment.

The Committee appointed by the Victoria Government to report on the best method of treating pyrites ores, gave the following summary of their report:—(1.) That it is decidedly better to crush quartz containing pyrites raw. (2.) That the method of

concentration which has given the most satisfaction in this colony is the use of Borlase's buddle with Munday's patent scrapers. (3.) That it is absolutely necessary to roast pyrites previous to amalgamation, and for this purpose reverberatory furnaces with inclined hearths are the best at present in use in the colony. That the introduction of combustible substances with the charge is not advisable, and that attention should be given to the regular supply of fuel and to the proper regulation of the draught. (4.) That for the purpose of amalgamation Wheeler's pans and Chilian mills are both very efficient, but, owing to the inability of the board to obtain analyses of the waste from each description of machine, their comparative saving values cannot be determined. (5.) That the evil effects of the noxious fumes on health and vegetation are not at all great, and can be easily and wholly avoided by the use of water condensers in conjunction with suitable flues and high chimney stacks, and that the water used in condensing be disposed of in the most effectual manner that the local features in each case admit. And (6) that it would be very advantageous if large central works were erected for the thorough treatment of pyrites and the whole of the wast products thereof, and that encouragement should be given by the Government, either by way of bonus or suitable site, to the person or company first establishing such works.

The following arrangement of plates has been found to save an increased percentage of gold in Victoria. The first plate, which is 9 inches wide and runs the length of the stamp box, is placed horizontally and on a level with the grating frame. This plate receives the pulverised quartz directly from the grating, the force of the discharge being sufficient to keep the plate clear, although it is horizontal. The sand, after running over this plate, is conveyed to the second plate pitching toward the box, and passes from it to a narrow plate 4 inches wide, laid on the ledge of the box, from which, after travelling over the ordinary plates and ripples, it is received on a blanket slide. The latter acts in a somewhat similar manner to the first and second copper plates, and is specially intended to catch pyrites and loose mercury.

The arrangement of the first two copper plates, combined with the splash from the grating, forms the basis upon which the merit of the contrivance rests.

The splash forces the sand gently over the first plate to the top of the second one, and as it recedes from the latter it is caught by the succeeding splash, which forces it partly back again, thus checking and moderating its momentum and keeping up a wave-like motion. This is favorble to the deposition of the fine gold, which would otherwise be carried away by the rush of water without coming into contact with the copper plates, owing no doubt to its lightness, a good deal of it being all but imponderable.

The following papers bearing on Nova Scotia Geology and Mineralogy have been published during the past year:—

Dr. Honeyman.—Geology, King's County:—Reviews of Nova Scotia Geology. *Nova Scotia Inst. Nat. Science.*

H. Louis.—New Mineral (Louisite) from Blomidon:—The Ankerite Veins of Londonderry.—*Ibid.*

E. Gilpin.—The Limonite and Limestones of Pictou Co.—*Ibid.* Notes on Nova Scotia Pit Waters:—*North of England Institute of Mining Engineers.*

H. S. Poole, F. G. S.—The Gold Veins of Nova Scotia:—*Geological Society of London.*

Principal Dawson.—McGill College; Notes on the Geology of Nova Scotia:—*Canadian Naturalist.*

I have the honor to be Sir,

Your obedient Servant,

EDWIN GILPIN, Jr.

Inspector of Mines.

LIST OF MINERAL LEASES (OTHER THAN COAL.)

No.	Lessee.	District.	Area Sq. Miles.	
	COPPER.			
	ANTIGONISH CO.			
2	Ross, Sarah, and others		1	
	COLCHESTER CO.			
	Moir, Wm. C. et al.	Tatamagouche	$10\frac{1}{2}$	
	LEAD.			
	HALIFAX CO.			
1	McClure, Charles F	Gay's River	1	
	IRON.			
	PICTOU CO.			
35	Carmichael, John R.	East River	1	
32, 33, 34, 36, 37, 38, 40, 41	Hamilton, John and others	"	9	
39	Hudson, James	"	1	
	CAPE BRETON CO.			
86	Brookman, S. J. et al	N. Side East Bay	1	
91	Brookman, Phœbe	East Bay	1	
84	Protheroe, Pryse	Cow Bay	1	
	INVERNESS CO.			
16	Inverness C. I. & R. Co.	Whcocomagh	1	

Total Area under lease .... $27\frac{1}{2}$ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address
		ANTIGONISH Co.				
1	McKcKinnon, et al.		3			
		CUMBERLAND Co.				
44	Baker, John W		1			
13, 14, 15	Black, C. H. M		3			
21	Blight, James, et all		1			
47	Boston, C. M. Co.		1		John Moffat	River Hebert
25	Campbell, Alex., et. al		1			
32, 34	Campbell, Alex., et. al		2			
35, 48, 49, 50	Campbell, Alex		4			
31,33,37,38,40,41,45,46,	Campbell, John		8			
12	Cumberland, C. M. Co		4			
17	Domville, James		3		E. N. Sharp	St. John, N.B.
	Joggins, C. M. Association	Joggins	2	working.	B. B. Barnhill *Robert Redpath*.	Joggins.
	Joggins, C. M. Co	Cumberland	2			
20	Kirby, Lewis R.		1			
18, 19	Livesey, John		2			
5	Lawson, C. M. Association	Maccan	1			
42	Macfarlane, Alex		1			
51	Milner, Christopher		71			
1, 2, 3, 4	New York & Acadia Co	Scotia	4	working.	William Bennett	Maccan.

43	Pugwash & Spring Hill R. Co.	....	1			
16	Seaman, Gilbert..........	....	1			
24	Shannon, S. L.....	....	2			
36, 39	Shannon, S. L., (in-trust) et al	....	2			
6, 7, 8	Spring Hill Mining Co......	Spring Hill......	3	working.	*William Hall*....	Spring Hill.
52	" "	"	4		" "	" "
22, 23, 28, 29, 30	Styles Mining Co. (Limited).	....	5		J. S. Hickman....	Amherst.
9	Victoria Coal Mining Co....	....	2			
26, 27	Wright, John V	....	3			
		PICTOU CO.	65			
1	Acadia Coal Co............	Fraser	1			
3	" " "	Acadia..........	1	working.	H. S. Poole	Stellarton.
42	" " "	Pictou	4		*J. Maxwell*	Westville.
					"	"
23	Allan, Sir Hugh, Kt........	Vale	3	working.	J. B. Moore .... *John Greener* ..	New Glasgow. Vale Colliery.
10	Gray, B. G	....	1			
11	Haliburton, R. G., et al	....	1			
	Halifax Company, (Limited).	Albion	4		S. Cunard & Co. *James Hudson*.	Halifax. Stellarton.
13, 14	Intercolonial Company	....	2			
12	" "	Drummond	1	working.	Robert Simpson ..	Westville.
6	Kirby, Lewis R	....	1			
15, 30, 31	Merigomish Company......	....	3			
25	Nova Scotia Company......	Black Diamond...	4		W. W. White	Westville.
20	Price, D. E., et al..........	....	2			
24	Richey, M. H..............	....	1			
			29			

LIST OF COAL LEASES.—Continued.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		Cape Breton Co.				
3	Archibald, Blowers.........	Gowrie..........	1	working.	Archibald & Co. *Chas. Archibald.*	North Sydney. Cow Bay.
2	Archibald, Thos. D..........	"	1			
5, 28	Blockhouse Mining Co.....	Blockhouse.......	2	working.	R. Belloni	Cow Bay.
29	" " *(sea area)*	....	1			
72	Brookman, Samuel.........	....	1			
76, 77	" S., et al.........	....	2			
15	Caledonia C. & R. Co.......	Caledonia........	1	working.	David MacKeen..	Caledonia Mines.
31	" *(sea area)*......	....	1			
30	Campbell Alex.............	....	1		T. D. Archibald ..	North Sydney.
23, 25, 70	Cape Breton Co. (Limited)..	....	3		Edgar S. Stirling..	Sydney.
14, 24	" " " " ..	Schooner Pond...	2		" ...	
49	" " " " ..	Reserve..........	1	working.	" ...	
64, 65, 68	" " " " ..	Lorway..........	3		" ...	
69	" " " " ..	Emery	1		" ...	
8, 9	Clyde Coal Mining Co......	Ontario..........	$1\frac{1}{2}$	working.	*John Sutherland* .	Port Caledonia.
87	Cossit, Geo. G......	....	1			
	General Mining Association..	Bridgeport	2			
	" " " ..	Sydney	5	working.	Rich'd H. Brown	Sydney Mines.
	" " " ..	"	12		*Cunard & Morrow*	Halifax.
27	" " *(sea area)*..	"	5		*Richard Wilson*..	
	" " " ..	Lingan..........	10	working.	*Donald Lynk*....	Lingan.
	" " " ..	"	4			

38, 39	Gen'l Mining Ass'n *(sea areas)*	Lingan	10			
10, 21	Gibson, John, et al		2			
4, 12, 16	Glace Bay Mining Co.	Glace Bay	3	working.	E. P. Archbold *Henry Mitchell*	Halifax. Little Glace
75	Henry, W. A.		1			
22	Ingraham, R. J. and J. L.	Halfway	1			
6, 13, 18, 19	International C. & R. Co.	International	4	working.	R. Belloni *P. Johnstone*	Cow Bay. Bridgeport.
71	Jennings, Edward		1			
47	LeCras & McInnes		1			
66	Merchant's Bank of Canada.	Gardener	2			
74	Moore & Moseley		$1\frac{1}{4}$			
81	Morton, Lemuel J		1			
80	McDonald, James		1			
52, 53	McLeod, Hugh		2			
88, 89, 90	Paint, Henry N. and others		3			
83, 85	Protheroe, Pryse		2			
73, 82	Reid, Thos. S., *(sea area)*		2			
40, 41, 42	Ross, H. E., et al.		3			
79	Ross, W. J., et al. *(sea area)*.		1			
43	South Head Coal Co.	South Head	1			
32	Sword, Wm., *(sea area)*.		3			
54 to 63	Sydney C. M. Co., *(sea areas)*.		10			
46	Todd, A. Thornton	Collins	1		George Scott	Little Bras d'Or.
67	Weatherbe & Kirby		1			
78	Weatherbe, R. L., *(sea area)*.		5			
34, 35, 36	Victoria C. M. C., *(sea area)*.	Victoria	5			
50, 51	" "		2			
			$130\frac{3}{4}$			

LIST OF COAL LEASES.—Continued.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		Inverness Co.				
5	Aylmer, John Evans Freke..	Cape Mabou.....	2			
8	Evans, Thomas............	Chimney Corner..	1			
9	Evans, Thomas (*sea area*)...	....	1			
7, 12	Inverness C. I. & R. Co.....	....	2	working.	Alex. Wright	Broad Cove.
13	Murray, George.	Port Hood	3			
4	Richey, M. H., et al	....	1			
11	Ross, W. J................	Broad Cove......	1			
6	Ross, H. E., et al, (*sea area*).	....	1			
14, 15	Smyth, Peter..............	....	2			
10	Tremain, E. D., (*sea area*)...	....	1			
			15			
		Richmond Co.				
2	Marmaud, A. E............	Little River	1			
			1			
		Victoria Co.				
2	Campbell, Chas. J	New Campbellton.	3	working.	John McDonald ..	N. Campellton.
3, 4, 5	Ross, William.............	Black Rock......	5			
			8			

Total area under lease.............................. $253\frac{1}{4}$ square miles.

COAL TRADE BY COUNTIES.

TABLE A.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter.......	16,604	15,029	68,012	38,837	16,910	4,222	....	35	101,526	58,123
2nd Quarter.......	23,210	20,104	97,181	80,657	70,717	62,297	831	450	191,939	163,508
3rd Quarter.......	24,664	22,943	137,486	128,062	106,560	107,075	1,803	1,737	270,513	259,817
4th Quarter.......	34,744	32,595	85,807	83,322	101,797	89,330	1,945	1,929	224,295	207,176
Total	99,222	90,671	388,486	330,878	295,984	262,924	4,579	4,151	788,271	688,624
1878.............	113,873	104,869	315,395	288,403	340,056	299,055	1,279	1,184	770,603	693,511
1877.............	107,004	99,078	306,477	284,155	340,416	301,981	3,599	1,851	757,496	687,065
1876.............	93,232	84,528	306,390	275,618	304,102	268,808	5,922	5,253	709,046	634,207

COAL TRADE BY COUNTIES.

TABLE B.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.....	12,092	7,029	67,084	38,498	1,167	5,201	41	......	80,384	51,728	131,112
Sea-borne......	......	......	52,673	10,051	79,889	2,772	1,523	......	134,185	12,823	147,008
Nova Scotia—Total.	12,092	7,029	119,757	48,549	81,156	7,973	1,564	......	214,579	63,551	278,120
Quebec...........	8,727	117	102,612	605	41,342	68	647	......	153,328	790	154,118
New Brunswick ...	50,971	11,735	3,011	1,315	17,058	81	560	......	71,600	13,131	84,731
Newfoundland.....	......	......	98	......	56,246	170	1,137	......	57,481	170	57,651
P. E. Island.......	......	......	13,793	24,303	5,793	754	243	......	19,829	25,062	44,891
United States	......	......	15,165	432	25,461	10,583	......	......	40,626	11,015	51,641
West Indies.......	......	......	815	......	9,309	......	......	......	10,124	......	10,124
Europe...........	......	......	423	.....	6,925	.....	......	......	7,348	......	7,348
Total	717,90	18,881	255,674	75,204	243,290	19,664	4,151	......	574,905	113,719	688,624
1878.............	84,244	20,625	198,641	89,762	277,914	21,141	1,184	......	561,983	131,528	693,511
1877.............	81,644	17,434	211,707	72,448	282,710	19,271	1,849	2	576,910	109,155	687,065
1876.............	68,377	16,151	217,530	58,088	247,001	21,807	5,121	132	538,029	96,178	634,207

COAL.—Sales.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1879.	1878.
Nova Scotia.						
Land Sales...	44,456	25,775	21,189	39,692	131,112	142,856
Sea-borne	1,669	34,050	50,049	61,240	147,008	137,316
N. Scotia--Total	46,125	59,825	71,238	100,932	278,120	279,172
Quebec	464	45,659	85,479	22,516	154,118	83,710
New Brunswick	9,890	18,175	25,069	31,597	84,731	115,245
Newfoundland .	....	13,534	23,115	21,002	57,651	61,361
P. E. Island...	....	8,361	22,403	14,127	44,891	43,412
United States...	1,081	13,872	27,946	8,742	51,641	88,495
West Indies....	361	3,912	2,291	3,560	10,124	16,999
S. America......	....	....	....	....	....	523
Europe	202	170	2,276	4,700	7,348	3,594
Total	58,123	163,508	259,817	207,176	688,624	693,511
1878	65,516	173,929	271,279	182,787	693,511	693,511
1877	47,843	146,079	290,789	202,354	687,065	687,065

COAL.—General Statement.

1879.	Produce.	Sales.	Colliery Consumption.
1st Quarter........................Tons	101,526	58,123	20,511
2nd Quarter...................... .... "	191,939	162,508	20,955
3rd Quarter........................ "	270,513	259,817	20,481
4th Quarter......... .... "	224,293	207,176	22,840
Total	788,271	688,624	84,787
1878........	770,603	693,511	88,627
1877	757,496	687,065	98,841
1876	709,646	634,207	113,788

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31ST 1879.

Collieries.	Seams.	Produce.	Sales.				Colliery Consumption.		
			Bearing Royalty.	Free.	Total.	Per Centage.	Engines.	Workmen.	Per Centage
Cumberland County.									
Joggins	Joggins Main	9,061	7,145	914	8,059	88	885	130	11
Scotia	North Seam	710	832	185	1,017	..	50	......	7
Spring Hill	Black	88,405	62,842	17,614	80,456	91	5,365	1,623	7
Chignecto	North Seam	914	871	168	1,039	..	......	......	...
Milner	......	182	......	......	......	..	......	......	...
Pictou County.									
Acadia	Acadia	87,750	56,104	21,206	77,310	88	5,299	1,579	7
Albion Mines	Main	171,534	96,927	34,493	131,420	76	15,060	3,824	11
Intercolonial	Acadia	85,017	70,593	14,077	84,670	99	2,550	1,260	4
Vale	McBean	44,185	32,050	5,427	37,477	84	3,617	1,127	15
Cape Breton County.									
Block House	Block House	27,509	21,164	2,355	23,519	85	2,440	1,715	15
Caledonia	Phelan	14,927	11,622	1,762	13,384	89	537	574	7
Glace Bay	Harbor	22,947	23,064	215	23,279	...	2,713	986	16
Gowrie	McAulay	21,735	25,658	5,584	31,242	...	786	2,270	14
International	Harbor	25,425	21,066	457	21,523	84	1 527	715	8
Lingan	Lingan	12,957	9,484	736	10,220	78	1'779	653	18
Ontario	Phelan	14,820	12,975	1,357	14,332	96	372	660	6
Reserve	Phelan	20,886	15,081	2,188	17,269	82	2,207	917	14
Sydney Mines	Main	134,778	103,277	4,982	108,259	82	16,183	6,241	16
Inverness County.									
Broad Cove	......	673	671	......	671	99	49	23	10
Victoria County.									
New Campbellton	......	3,906	3,480	......	3,480	89	80	127	5
		788,271	574,906	113,720	688,624	......	61,499	24,424	......

Statement of the Number and Classes of Persons employed, and average results at each Colliery during the year ended December 31, 1879.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of days per person		Average No. of tons per Cutter.	Average tons per day per Cutter.	Average quantity raised per day—Tons.	Horses.		Pits Worked.
	Cutters.	Laborers.	Boys.	Days Labor.	Mechanics.	Laborers.	Boys.	Days Labor.	Persons.	Days Labor.	Persons.	Days Labor.	Underground.	Surface.				Above.	Below.	Days.
Chignecto .... Cumberland	3	1	..	806	...	1	1	468	...	....	6	1,284	204	234	305	......	....	1	..	......
Joggins ...... "	22	2	6	6,031	8	[illegible]	4	8,864	1	134	47	15,029	200	50	414	2.7	60	5	1	149
Spring Hill ... "	147	43	48	49,185	24	46	10	15,628	6	1,051	324	65,864	176	194	601	2.9	429	16	44	206
Scotia .... "	4	..	..	594	...	1	1	290	...	....	6	884	148	145	177	....	......	2	...	....
Acadia, ... Pictou	105	22	18	34,913	25	43	2	18,406	..	....	215	53,319	240	262	835	3.2	341	7	4	257
Albion Mines......... "	259	41	84	85,968	39	124	37	52,881	..	....	584	138,849	224	264	662	2.1	568	17	38	302
International .... "	95	48	27	35,318	28	38	7	20,894	2	213	245	56,425	235	281	895	4.2	403	6	5	211
Vale. .... "	110	24	9	26,649	21	22	5	15,525	...	....	191	42,174	186	300	401	3.3	363	6	7	121
Block House, ... C. B.	76	8	39	10,717	21	24	4	10,234	..	....	172	20,951	86	208	361	5.4	410	12	28	67
Caledonia.............. "	27	3	4	5,420	9	10	2	3,969	..	......	55	9,389	160	188	552	6.1	165	6	5	90
Glace Bay.......... "	53	1	7	8,610	19	8	5	7,834	..	......	92	16,444	141	244	433	2.3	121	3	2	189
Gowrie .... "	68	9	24	12,724	9	23	13	7,665	7	870	153	21,259	127	164	319	3.1	215	15	14	101
International .... "	50	6	16	10,194	13	24	4	7,420	...	....	113	17,614	141	181	508	5.5	276	3	9	92
Lingan............. "	32	8	12	6,009	3	17	7	5,523	3	205	77	11,737	128	190	405	5.7	182	6	6	71
Ontario .... "	34	6	1	6,683	8	24	2	5,619	..	....	75	12,302	163	165	435	2.2	77	3	2	192
Reserve .... "	54	2	9	7,178	6	6	2	2,516	..	....	79	9,694	110	180	386	3.3	181	1	6	115
Sydney Mines ...... "	231	31	73	71,056	66	95	31	51,185	34	9,078	561	131,319	212	268	586	2.2	526	10	23	256
New Campbellton..... Vic.	16	8	3	3,966	3	6	3	2,099	..	......	39	6,065	147	169	244	1.7	19	2	0	135
	1,386	258	380	382,041	302	516	139	237020	53	11,551	3034	630,602	188	206	502	3.4	271	121	194	151

COLLIERY CONSTRUCTION ACCOUNT, 1879.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Collery. Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospect'g.	TOTAL.
CUMBERLAND CO.											
Joggins				400.00							400.00
Chignecto								500.00			500.00
Scotia											
Spring Hill					624.00	3,000.00	675.00	444.73			4743.73
PICTOU CO.											
Acadia		2,709.83		100.00	372.49		17.34		3,996.85		7,196.51
Albion Mines				370.47	46.41		4,088.15				4,505.03
Intercolonial			1,750.87	1,164.68	678.98			833.94			4,428.47
Vale		1,580.00									1,580.00
CAPE BRETON CO.											
Block House											
Caledonia			137.00								137.00
Glace Bay											
Gowrie			423.00						3,800.00		4,223.00
International											
Lingan			92.00	335.00							427.00
Ontario			367.00		300.00	35.00		200.00			902.00
Reserve			445.30								445.30
Sydney Mines				4,567.91		771.63	4,412·39		631.18		10,383.11
INVERNESS CO.											
Broad Cove		384.24		1,082.27	238.20		828.63	120.57	29.60		2,683.51
H. McDonald Lease			36.00							227.43	263.43
VICTORIA CO.											
New Campbellton			500.00								500.00
		$4,674.07	$3,751.17	$8,020.33	$2,260.08	$3,806.63	$10,021.51	$2,099.24	$8,457.63	$227.43	$43,318.09

COAL SALES in Nova Scotia from 1785 to 1879, (Inclusive.)

Year.	Sales.	Total.
1785	1,668	
1786	2,000	
1787 1788 1789 1790	10,681	14,349
1791	2,670	
1792	2,143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	70,452
1811	8,516	
1812	9,570	
1813	9,744	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	91,527
1821	11,388	
1822	7,512	
1823 1824 1825	27,000	
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	140,820

Year.	Sales.	Total.
1831	37,170	
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145,962	
1840	101,198	839,981
1841	148,298	
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	2,399,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576,935	
1865	635,586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	4,927,339
1871	596,418	
1872	785,914	
1873	881,106	
1874	749,127	
1875	706,795	
1876	634,207	
1877	697,065	
1878	693,511	
1879	688,626	6,422,769
	Total....	16,491,912

SUMMARY.

1785 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1879	6,422,769

Nova Scotia exported to the United States.

COAL.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1866	404,252	$1.25
1851	116,274	"	1867	338,492	"
1852	87,542	"	1868	228,132	"
1853	120,764	"	1869	257,485	"
1854	139,125	Free.	1870	168,180	"
1855	103,222	"	1871	165,431	"
1856	126,152	"	1872	154,092	.75
1857	123,335	"	1873	264,760	"
1858	186,743	"	1874	138,335	"
1859	122,720	"	1875	89,746	"
1860	149,289	"	1876	71,634	"
1861	204,457	"	1877	118,216	"
1862	192,612	"	1878	88,495	"
1863	282,775	"	1879	51,641	
1864	347,594	"			
1865	465,194	"			

NOTE.—The quantities given for the Years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably underestimated. At least, the figures given by the Board of Trade for the year 1873, the only year available for comparison with the comprehensive tables now published by this Department, are 12 per cent. below those given in the above table.—H. S. P.

GOLD.

GENERAL STATEMENT FOR THE YEAR 1879.

Shewing the number of Mines at work, days' labour performed, quantity of Quartz, &c., crushed, yield of Gold, &c., &c., &c., for the Twelve Months ended December 31st.

DISTRICTS.	Number of Mines.	Days' Labour.	Mills employed.	Steam Power.	Water Power.	Quartz, &c., Crushed.	Yield per Ton.			Maximum yield per Ton.			Total yield of Gold.			Average yield per man per day for twelve months, at $18.00 per oz.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou	5	7,648	3	3	....	781	0	17	7	4	0	21	676	1	21	$1.60
Gay's River	1	1,031	1	....	1	100	0	8	4	....	15	5	41	0	1	.71
Montague	2	4,483	3	3	....	485	3	3	0	6	13	6	1,527	10	20	6.13
Oldham	2	5,322	2	1	1	1,787	0	17	22	11	2	20	1,600	17	0	5.41
Renfrew	1	734	1	....	1	419	0	5	0	0	12	9	104	1	20	2.64
Sherbrooke	16	44,965	7	4	3	9,209	0	16	1	17	12	0	7,389	17	15	2.97
Stormont	1	3,447	....	....	....	124	1	11	6	2	1	21	198	15	0	1.03
Tangier	4	9,267	3	1	2	1,454	0	10	6	3	0	0	857	7	12	1.66
Uniacke	3	7,775	2	2	....	744	1	1	4	3	5	16	787	18	0	1.82
Waverley	2	2,922	2	1	1	442	0	5	7	1	8	0	116	11	1	71
Wine Harbor	1	3,166	2	1	1	424	1	0	0	9	5	0	427	5	6	2.40
Unproclaimed, &c.	2	1,242	2	....	2	57	1	6	0	19	18	21	74	2	22	1.00
	40	92,002	28	16	12	15,936	0	17	8	19	18	21	13,801	8	10	2.34

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

Month.	Caribou.							Gay's River.							Montagu.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January	7	786	30	45	77	5	8	2	178	6	22	9	7	7	1	36	2	..	..	..	..
February ...	7	785	30	46	0	0	..	2	190	8	28	21	8	11	1	26	1	7	4	0	20
March.......	6	654	25	46	35	17	..	2	165	6	1	0	4	00	1	58	2	0	..	..	..
April	8	407	15	90	53	13	6	.	....	..	..	..	..	..	1	51	2	10	5	5	15
May	7	618	23	123	94	5	19	1	113	4	28	3	12	22	2	145	5	..	..	..	..
June........	4	646	24	57	46	19	10	1	50	2	..	..	..	..	2	291	10	80	142	13	5
July	6	902	34	67	46	9	0	1	80	3	8	1	11	15	3	426	16	50	84	13	10
August......	4	581	22	0	0	0	0	1	78	3	8	1	19	0	5	701	27	82	364	17	15
September...	5	797	30	53	63	5	0	1	77	3	5	2	16	7	5	917	38	95	432	10	0
October	3	522	20	22	28	10	4	1	48	2	..	..	..	11	2	655	25	72	220	9	18
November ...	4	399	15	87	89	17	13	1	52	2	..	..	..	..	2	506	19	15	26	11	9
December....	6	541	21	145	139	18	13	.	....	..	..	..	..	..	2	671	26	74	246	9	0
	5	7,648	....	781	676	1	21	1	1,031	....	100	41	0	1	2	4,483	....	485	1,527	10	20

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued.)

Month.	Oldham.							Renfrew.							Sherbrooke.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January	2	293	11	99	56	6	14	..	....	..	53	16	1	18	16	3,614	139	782	492	0	20
February.....	2	301	12	96	75	2	13	..	....	..	..	..	..	..	18	3,536	136	849	489	15	0
March	2	423	16	87	56	5	1	..	....	..	25	2	15	0	16	3,432	132	892	495	19	0
April	1	259	9	145	119	9	16	..	....	..	45	12	5	2	16	3,536	136	622	472	15	0
May	2	378	14	184	215	18	0	..	....	..	16	4	11	0	15	3,600	138	628	548	14	12
June	2	526	20	164	155	17	10	..	....	..	52	14	10	0	16	4,100	158	907	1,005	8	1
July.........	3	663	25	76	90	11	13	1	200	7	37	7	10	0	16	3,900	150	477	779	19	0
August	1	172	6	123	30	5	16	2	36	2	16	3	1	0	15	3,700	142	771	816	12	0
September....	2	374	14	186	185	17	8	2	150	6	54	8	4	0	18	3,848	147	1,040	712	3	12
October	3	486	18	116	86	1	23	1	78	2	23	6	10	0	15	4,021	154	611	437	18	0
November	4	876	33	243	442	4	19	2	135	5	43	9	11	0	15	3,720	146	951	649	7	18
December	3	571	22	268	86	16	11	2	135	5	55	19	3	0	14	4,158	159	674	489	5	0
	2	5,322	..	1,787	1,600	17	0	1	734	....	419	104	1	20	16	44,965	....	9,209	7,389	17	15

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(Continued.)

Month.	Stormont.							Tangier.							Uniacke.						
	No. of Mines.	Days' Lbaor.	Men.	Tons.	Oz.	Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.		Dwt.	Gr.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January	1	267	10	.....	.....	...	...	5	849	32	199	89	8	18	1	36	1	6	2	4	0
February	1	245	9	.....	.....	...	...	5	906	34	107	60	16	21	3	512	20	60	46	17	0
March	1	334	12	.....	.....	...	..	5	2,088	80	226	124	7	3	2	338	12	40	62	7	0
April	1	274	10	.....	.....	...	...	3	283	10	12	3	19	11	3	751	24	57	82	11	0
May..........	1	115	9	47	81	10	0	4	478	18	257	231	7	1	3	519	20	88	29	3	0
June	1	280	10	.....	.....	...	...	4	538	20	56	34	12	16	4	776	29	64	131	11	0
July	1	391	14	.....	.....	...	...	3	417	16	50	52	7	6	3	340	12	36	29	2	0
August	1	351	12	.....	.....	...	...	3	417	16	71	24	0	14	3	1,290	50	103	126	6	0
September....	1	284	10	34	71	5	0	3	1,239	27	145	66	11	12	3	252	9	43	22	4	0
October	1	314	17	.....	.....	...	...	4	617	23	98	50	3	22	4	972	37	97	77	10	0
November	1	369	18	.....	.....	...	...	4	415	16	172	72	19	17	3	784	30	87	94	7	0
December	1	223	9	43	46	0	0	5	1,120	43	81	46	12	3	5	1,205	46	63	83	16	0
	1	3,447	....	124	198	15	0	4	9,267	....	1,464	857	7	12	3	7,775	....	744	787	18	0

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(Continued)

Month.	Waverley. No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	Wine Harbor. No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.	Unproclaimed, &c. No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Gr.
January......	1	184	7	40	17	8	0	..	......	....	.....	.....	...	...	..	......	....	.....	.....	...	...
February	1	174	6	85	17	18	0	..	......	....	.....	.....	...	...	1	13	1	2	1	14	5
March	2	270	10	83	8	8	0	..	......	....	.....	.....	...	...	..	......	....	.....	.....	...	...
April	3	286	11	47	9	9	19	2	347	12	29	134	6	12	..	......	....	.....	.....	...	...
May	2	163	6	39	8	8	8	2	385	13	14	9	14	0	..	......	....	.....	.....	...	...
June	..	....	....	.....	.....	...	...	1	343	10	.....	.....	...	...	1	4	1	4	1	13	6
July	2	270	10	62	17	4	0	2	302	11	87	120	11	12	4	243	9	8	9	1	0
August	2	310	12	9	2	10	0	2	341	12	60	48	12	0	5	335	12	7	14	4	0
September....	2	383	14	12	8	15	0	2	340	12	42	19	11	0	5	311	11	15	13	8	20
October	3	382	14	18	9	11	0	2	710	27	.....	.....	...	...	2	70	2	5	3	16	0
November....	3	198	7	34	12	14	22	2	353	13	139	17	8	0	3	120	4	16	39	5	15
December	3	302	10	13	4	4	0	1	45	2	53	24	2	6	1	146	5	.....	.....	...	...
	2	2,922	....	442	116	11	1	1	3,166	....	424	427	5	6	2	1,242	....	57	74	2	22

GOLD.

GENERAL ANNUAL SUMMARY.

Year.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2000 lbs.			Total days' Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A Day.	A Year
1862	7,275			6,473	1	2	11	156,000	$ .83	$249
1863	14,001	14	17	17,092		16	11	273,624	.92	276
1864	20,022	18	13	21,434		18	16	252,720	1.42	426
1865	25,454	4	8	24,423	1	0	20	212,963	2.15	645
1866	25,204	13	2	32,161		15	2	211,796	2 14	642
1867	27,314	11	11	31,386		17	9	218,894	2.24	672
1868	20,541	6	10	32,262		12	17	241,462	1.53	459
1869	17,868	0	19	35,147		10	4	210,938	1.52	456
1870	19,866	5	5	30,829		12	21	173,680	2.05	615
1871	19,227	7	4	30,791		12	11	162,994	2 12	636
1872	13,094	17	6	17,093		15	7	112,476	2.09	627
1873	11,852	7	19	17,708		13	9	93,470	2.28	684
1874	9,140	13	9	13,844		13	5	77,246	2.12	636
1875	11,208	14	19	14,810		15	4	91,698	2.20	660
1876	12,038	13	18	15,490		15	13	111,304	1.94	582
1877	16,882	6	1	17,369		19	10	123,565	2.46	738
1878	12,577	1	22	17,990		13	23	110,422	2.05	615
1879	13,801	8	10	15,936		17	8	92,002	2.34	732
Total.	297,372	5	1	382,148				292,725		

DISTRICT SUMMARY.

CARIBOU.

Year.	Total ounces of Gold extracted			Quartz Crushed.	Yield per Ton of 2000 lbs.			Total days Labor.	Average yield per man per day in dwts at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1869	1,001	0	23	1,583		12	17	11,076	1.80	$1.62
1870	613	11	2	755		16	6	6 509	1.88	1.64
1871	504	15	23	479	1	1	1	2,964	3.40	3.06
1872	209	15	0	368		11	9	2,184	1.92	1.72
1873	17	16	12	21		16	23	312	1.14	1.02
1874	368	10	23	333	1	2	3	4,651	1.58	1.42
1875	446	12	19	368	1	4	6	3,675	2.43	2.18
1876	727	4	10	542	1	6	11	6,090	2.39	2.15
1877	2,596	13	23	1,735	1	9	21	14,579	3.56	3.20
1878	1,026	12	16	928	1	2	2	9,188	2.23	2.01
1879	676	1	21	781		17	7	7,648	1.77	1.60

MONTAGUE.

Year.	Total ounces of Gold extracted			Stuff Crushed	Yield per Ton of 2000 lbs,			Total days' labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwts.	
1863	336	14	16	140	2	16	2	38,688	.18	$ .16
1864	1,052	19	14	545	1	18	15	11,492	1.83	1.64
1865	902	12	23	615	1	9	8	12,376	1.45	1.30
1866	496	15	10	382	1	6	0	6,032	1.64	1.47
1867	436	15	16	244	1	15	11	7,826	1.11	.99
1868	584	14	22	350	1	13	0	7,384	1.58	1 42
1869	805	13	14	572	1	8	3	8,944	1.80	1.62
1870	3,831	9	5	916	4	3	14	15,106	5.06	4.55
1871	3,152	8	15	848	3	14	8	15,938	3.95	3.55
1872	1,793	10	6	683	2	12	12	13,832	2.59	2.33
1873	1,440	3	9	679	2	2	9	10,972	3.62	2.35
1874	655	0	22	496	1	6	10	5,452	2.40	2.16
1875	287	18	17	72	3	19	23	2,526	2.27	2.05
1876	149	1	17	81	1	16	19	1,404	2.83	2.38
1877	50	1	9	55		18	5	1,405	.71	.64
1878	158	6	12	192		16	12	2,065	1.53	1.37
1879	1,527	10	20	485	3	3	0	4,483	6.81	6.13

OLDHAM.

1862	51	0	0	84		12	3	4,368	.23	$ .20
1863	1,223	3	21	1,026	1	4	6	25,896	.94	.84
1864	1,750	5	12	2,238		15	11	37,934	.94	.84
1865	1,126	11	20	2,236		10	1	18,278	1.23	1.10
1866	956	12	20	966		19	19	11,362	1.68	1.51
1867	1,100	3	14	870	1	5	7	15,418	1.42	1.27
1868	719	0	4	1,012		14	4	8,008	1.79	1.61
1869	1,394	16	0	1,735		16	1	17,576	1.58	1.42
1870	2,051	15	3	2,644		15	12	20,254	2 02	1.81
1871	1,718	12	12	1,374	1	4	4	13,494	2.54	2.28
1872	1,014	11	10	793	1	5	14	8,580	2.36	2.12
1873	998	2	17	662	1	10	3	6,994	2.85	2.46
1874	665	8	11	527	1	5	6	3,420	3.86	3.27
1875	915	8	3	550	1	13	6	6,100	3.00	2.70
1876	1,953	5	23	1.705	1	2	21	15,757	2.47	2.22
1877	2,527	19	13	2,015	1	5	2	14,144	3.57	3.21
1878	1,737	9	9	1,808		19	5	10,599	3.27	2.95
1879	1,600	17	0	1 787		17	22	5,322	6.00	5.41

RENFREW.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days' Labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1862	308	8	0	171	1	15	10	10,920	.56	$ .50
1863	785	7	7	575	1	7	7	21,216	.74	.66
1864	1,172	6	5	1,229		19	1	12,220	1.91	1.71
1865	1,008	10	18	927	1	1	18	14,430	1.39	1.25
1866	6,423	15	11	6,003	1	1	9	38,142	3.36	3.02
1867	7,904	19	2	7,222	1	2	4	61,308	2.57	2.31
1868	3,373	14	9	5,994		11	6	39,598	1.70	1.53
1869	3,097	15	7	7,258		8	12	34,606	1.79	1.61
1870	1,171	18	11	3,243		7	2	11,310	2.07	1.86
1871	1,179	17	16	2.463		9	4	10,972	2.15	1.93
1872	323	3	8	855		7	13	5,668	1.14	1.02
1873	59	16	18	255		4	16	2,028	.59	.53
1874	3	3	7	10		6	7	190	.33	.29
1875	47	16	6	113		8	11	690	1.38	1.24
1876	75	14	10	164		9	5	1,307	1.15	1.03
1877	207	13	4	294		14	3	3,543	1.19	1.05
1878	155	17	10	380		8	5	1,769	1.76	1.58
1879	104	1	20	419		5	0	734	2.93	2.64

SHERBROOKE.

1862	2,023	0	0	663	3	1	0	22,464	1.80	$1.62
1863	3,304	14	12	3,454		19	8	31,200	2.11	1.89
1864	3,419	14	20	2,673	1	6	8	32,630	2.09	1.88
1865	3,424	1	21	2,511	1	7	6	23,010	2.97	2.67
1866	5,829	13	8	2,853	2	0	20	22,490	5.18	4.66
1867	9,463	18	0	7,378	1	5	15	35,958	5.31	4.78
1868	7,070	0	5	9,880		14	7	59,540	2.37	2.13
1869	5,546	11	16	11,500		9	15	41,964	2.64	2.37
1870	7,134	4	0	11,428		12	11	48,880	2.91	2.61
1871	6,579	19	7	13,882		9	9	50,856	2.58	2.32
1872	4,188	9	21	5,243		15	17	38,246	2.21	1.98
1873	5,026	0	4	7,187		15	9	31,460	3.19	2.87
1874	4,037	1	2	5,430		14	20	31,199	2.58	2.32
1875	5,818	15	10	6,443		18	1	38,683	3.00	2.70
1876	5,176	15	15	6,205		16	16	37,269	2.77	2.49
1877	8,237	3	10	8,654		19	1	47,725	3.45	3.10
1878	6,843	1	15	9,340		14	17	50,827	2.69	2.42
1879	7,389	17	15	9,209		16	1	44,965	3.30	2.97

STORMONT.

Year.	Total ounces of Gold extracted.	Stuff crushed.	Yield per Ton of 2000 lbs.	Total days' Labor.	Average yield per man per day in dwts. at $0.90.	
	Oz. Dwt. Gr.		Oz. Dwt. Gr.		Dwt.	
1862	397 0 0	197	2 0 7	12,792	.62	$ .55
1863	1,587 13 12	526	3 0 7	15,600	2.03	1.82
1864	1,510 4 21	636	2 7 11	25,844	1.16	1.04
1865	1,696 6 2	1,040	1 12 14	25,350	1.29	1.16
1866	1,254 17 9	2,253	11 2	11,208	2.23	2.00
1867	1,266 16 15	782	1 11 3	12,428	2.03	1.82
1868	673 2 17	596	1 2 14	14,560	.92	.82
1869	227 0 13	590	7 16	6,110	.74	.66
1870	578 5 15	1,525	7 13	6,552	1.76	1.58
1871	559 7 21	1,937	5 18	5,590	2.00	1.80
1872	472 0 11	543	17 9	4,316	2.18	1.96
1873	37 18 5	181	4 4	832	.91	.81
1874	167 19 20	236	14 5	1,799	1.86	1.67
1875	267 6 18	620	8 14	2,543	2.10	1.89
1876	267 0 5	370	14 10	3,607	1.48	1.33
1877	240 19 0	9[illegible]	2 10 4	3,310	1.45	1.30
1878	106 10 0	74	1 8 19	3,015	.71	.64
1879	198 15 0	124	1 11 6	3,447	1.14	1.03

TANGIER.

1862	865 0 0	707	1 4 11	39,000	.44	$ .39
1863	494 7 21	655	15 2	37,440	.26	.23
1864	602 7 8	698	18 10	16,380	.74	.66
1865	644 7 13	639	1 0 4	13,156	.97	.87
1866	296 5 21	791	7 11	9,074	.65	.58
1867	691 1 7	724	19 2	6,864	2.01	1.80
1868	921 8 9	725	1 4 7	11,700	1.57	1.35
1869	1,192 3 10	1,332	17 21	15,938	1.49	1.34
1870	1,814 2 10	2,732	13 6	29,328	1.23	1.11
1871	2,095 0 7	2,924	14 7	27,326	1.53	1.38
1872	829 8 15	1,622	10 5	10,426	1.59	1.43
1873	726 11 15	1,070	13 4	8,892	1.63	1.46
1874	419 7 5	706	11 21	5,092	1.64	1.47
1875	448 2 15	1,106	8 1	6,667	1.34	1.21
1876	312 13 0	716	10 6	8,274	.92	.82
1877	410 14 15	364	1 2 13	5,102	1.61	1.42
1878	584 10 22	1,035	11 7	10,146	1.15	1.03
1879	857 7 12	1,464	10 6	9,267	1.84	1 66

UNIACKE.

Year.	Total ounces of Gold extracted. Oz.	Dwt.	Gr.	Stuff crushed. Tons.	Yield per Ton of 2000 lbs. Oz.	Dwt.	Gr.	Total days' Labor.	Average yield per man per day in dwt. at $0.90. Dwt.	
1866	72	16	9	28	2	12	0	1,326	1.09	$ .98
1867	1,622	13	20	1,968		16	12	14,274	2.27	2.04
1868	3,247	3	17	3,874		16	16	27,898	2.32	2.08
1869	1,867	3	12	3,172		11	18	22,022	1.69	1.52
1870	566	14	5	1,794		6	7	6,214	1.82	1.63
1871	360	17	3	900		8	0	4,342	1.66	1.49
1872	241	10	0	364		13	7	1,950	2.47	2.22
1873	129	8	18	198		13	1	1,222	2.52	2.26
1874	14	1	0	19		14	19	69	4.68	3.81
1875	139	3	3	319		8	17	2,643	1.05	.94
1876	227	14	10	321		14	4	4,752	.96	.86
1877	663	15	9	470	1	8	6	7,252	1.83	1.64
1878	629	5	7	704		17	21	5,711	2.20	1.98
1879	787	18	0	744	1	1	4	7,775	2.02	1.82

WAVERLEY.

1862	1,507	0	0	3,741		8	1	46,800	.66	$ .59
1863	2,380	6	3	6,755		7	1	58,344	.81	.72
1864	6,410	4	22	9,238		13	23	88,244	1.44	1.29
1865	14,404	4	9	12,518	1	3	0	87,308	3.29	2.96
1866	8,612	17	11	16,750		10	6	98,800	1.74	1.56
1867	3,942	5	2	10,510		7	12	46,436	1.69	1.52
1868	2,387	8	22	6,372		7	11	36,972	1.26	1.13
1869	1,591	14	10	3,915		8	3	16,796	1.89	1.70
1870	811	3	21	2,619		6	4	13,546	1.19	1.07
1871	1,427	18	12	2,772		10	6	17,472	1.62	1.45
1872	1,047	17	0	1,761		11	21	12,766	1.64	1.47
1873	1,009	0	0	2,013		10	0	13,520	1.49	1.34
1874	1,553	12	15	1,682		18	11	12,541	2.47	2.22
1875	1,740	1	0	1,313	1	6	12	18,807	1.85	1.66
1876	1,539	7	0	1,661		18	12	21,107	1.45	1.30
1877	866	18	10	1,422		12	4	14,261	1 21	1.09
1878	498	12	8	1,197		8	8	6,727	1.48	1.33
1879	116	11	1	442	0	5	7	2,922	.78	.71

WINE HARBOR.

Year.	Total ounces of Gold extracted.			Stuff crushed.	Yield per ton of 2000 lbs.			Total days' Labor.	Average yield per man per day in dwt. at $0.90.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		Dwt.	
1862	1,688	0	0	835	2	0	10	12,792	2.63	$ 2.36
1863	3,718	2	19	3,644	1	0	10	36,688	2.02	1.81
1864	4,033	3	7	4,136		19	12	22,984	3.50	3.15
1865	2.200	5	14	3,833		11	11	16,588	2.65	2.38
1866	1,012	8	4	1,881		10	18	8,814	2.29	2.06
1867	845	18	14	1,670		10	3	13,390	1.26	1.13
1868	1,248	6	3	2,938		8	12	23,166	1.00	90
1869	719	8	19	2,726		5	6	20,462	.70	.63
1870	914	15	14	2,356		7	17	8,034	2.27	2.04
1871	1,538	6	16	2,927		10	4	11,232	2.74	2.46
1872	2,572	10	18	2,305	1	2	7	8,840	5.82	2.23
1873	2,000	0	3	2,267		17	15	12,688	3.15	2.83
1874	633	11	6	1,193		10	14	5,605	2.26	2.03
1875	492	11	22	1,140		8	15	3,942	2.49	2.24
1876	1,217	19	7	1,929		12	15	7,848	3.10	2.79
1877	580	14	3	1,068		10	21	5,772	2.01	1.80
1878	492	13	12	814		12	2	4,471	2.20	1.98
1879	427	5	6	424	1	0	0	3,161	2.66	2.40

OTHER DISTRICTS.

1862	436	0	0	75	5	19	10	6,864	1.26	$1.13
1863	141	3	2	225		12	13	6,552	.43	.38
1864	66	12	0	38	1	15	0	4,992	.27	.24
1865	47	3	8	102		9	6	2,470	.38	.34
1866	248	10	19	250		19	23	4,550	1.09	.98
1867	36	6	17	16	2	9	3	4,992	.15	.13
1868	316	6	22	518		12	5	12,636	.50	.45
1869	424	12	15	761		11	3	15,444	.54	.48
1870	378	5	15	812		9	7	7,956	.95	.85
1871	112	2	16	281		8	0	2,808	.79	.71
1872	402	0	13	2,552		3	3	5,668	1.41	1.26
1873	407	9	13	3,175		2	13	4,550	1.79	1.61
1874	622	16	18	3,212		3	21	7,327	1.70	1.53
1875	604	18	2	2,766		4	9	5,422	2.23	2.00
1876	331	17	17	1,796		3	14	3,978	1.67	1.50
1877	499	13	1	1,196		8	8	6,473	1.54	1.39
1878	344	2	7	1,517		4	13	5,904	1.16	1.04
1879	74	2	22	57	1	6	0	1,242	1.11	1.00

Statement of Coals (in tons) received at the several Stations from Mines in Nova Scotia for the year ending 31st December, 1879.

STATIONS.	QUANTITY.	STATIONS.	QUANTITY.
Halifax	23,040	*Bro't forward*	124,485
Bedford	118		
Windsor Junction	2,160	Sussex	372
Wellington	18	Apohaqui	28
Enfield	30	Norton	32
Elmsdale	48	Bloomfield	12
Milford	42	Hampton	354
Shubenacadie	292	Rothsay	222
Stewiacke	208	Coldbrook	642
Brookfield	58	St. John	3,130
Truro	6,421	Chatham	34
Valley	6	Newcastle	66
West River	20	Bathurst	30
Glengarry	20	New Mills	12
Hopewell	158	Charlo	6
New Glasgow	5,560	Dalhousie	6
Pictou Landing	49,440	Campbellton	32
Belmont	16	Rimouski	290
Debert	52	Riviere du Loup	450
Londonderry	27,900	Chaudiere Junction	570
Wentworth	12	Three-mile House	858
Greenville	28	Logan's Siding	30
Thompson	12	Four-mile House	20
Oxford	198	Moir's	10
Athol	12	Rocky Lake	116
Maccan	6	Waterloo	6
Amherst	1,608	Grand Lake	6
Aulac	64	Oakfield	32
Sackville	1,216	Malcolm's	270
Dorchester	1,030	Battery Hill	16
Rockland	100	West Chester	6
Memramcook	12	Nappan	42
Shediac	72	Pergsley's	18
Point du Chene	20	Fort Lawrence	6
Moncton	2,334	Crowson's	6
Salisbury	1,916	Calhoun's	6
Petitcodiac	198	Humphrey's	10
Penobsquis	40		
		Total	141,231
Carried forward	124,485		

INTERCOLONIAL RAILWAY.

Statement showing the quantities, in tons, of the different kinds of Coal received from various Mines for the use of the Intercolonial Railway during the year 1879.

MONTHS.	Drummond.	Vale.	Albion.			Acadia.	Spring Hill.
			Round.	Small.	Coke.		
January	1,800	......	.....	10	20	69	3,969
February	2,127	......	.....	.....	....	......	2,860
March	1,967	......	.....	.....	....	......	2,584
April	2,036	......	.....	.....	....	......	3,261
May	1,148	......	.....	52	....	......	3,478
June	1,252	......	.....	9	10	......	4,084
July	1,024	......	.....	.....	10	......	5,478
August	2,853	......	52	10	....	......	165
September	1,173	970	261	82	....	......	8,097
October	1,468	30	.....	110	10	......	5,780
November	1,706	......	.....	175	....	10	5,959
December	....	1,501	180	75	....	72	6,201
Totals	18,554	2,501	493	523	50	151	51,916

General Storekeeper's Office,
Moncton, N. B., 10th February, 1880.

L. B. ARCHIBALD,
General Storekeeper.

COAL. Forwarded from the following Stations:		COKE. Forwarded from the Albion Mines:	
STATIONS.	Quantity.	STATIONS.	Tons.
New Glasgow.......	31,408	Halifax	80
Stellarton	57,796	Truro.............	50
Spring Hill.........	24,370	New Glasgow.....	40
Drummond	23,403	Stewiacke	30
Albion	3,814	Amherst	6
Maccan	440	Sackville	10
		River du Loup	20
		Chaudiere Junction	430
		Londonderry......	7,650
Total	141,231	Total	8,316

E. & O. E.

MONCTON, N. B.,
23rd January, 1880.

J. J. WALLACE,
Traffic Auditor.

MINERALS OTHERS THAN THOSE LEASED FROM THE CROWN.

GYPSUM EXPORTS—Tons of 2,000 lbs.

Windsor	Tons	50,450	Value......	$41,697
Cheverie	"	34,538	"	23,774
Maitland	"	200	"	140
Walton	"	3,635	"	2,470
Hantsport	"	1,415	"	1,302
Antigonish	"	1,373*	"	2,834
Wallace	"	55*	"	50
Baddeck	"	2,385	"	1,836 (?)
		1,075*	"	820 (?)
		95,126		$74,923

Walton—Ground Gypsum ..Tons 50* Value..$ 225

MANGANESE EXPORTS.—Stephens' Mine, Tenny Cape.

No. 1 ore	Tons	90	Value............	$ 4,950
" 2 "	"	55	"	2,220
		145		$ 7,170

* Newfoundland and the Dominion.

Barytes Exports—River John.

Tons	480	Value	$ 2,400

Building Stones.

Antigonish	Tons	18*	Value	$ 47
Wallace	"	4,569*	"	13,791
		1,975	"	7,900
		5,562		$21,638

Manufactured Stone.

Seaman's Cove—Grindstone	Tons	1,200	Value	$ 15,400
		200*	"	2,800
" " Scythe Stones	boxes	1,000	"	1,000
Parrsboro—Grindstones	Tons	270	"	1,890
				$21,090

Limestone as Flux.

Tons	7,000	Value	$ 14,000 (?)

Iron Mining.

Iron Ore	Tons	29,889
Ankerite	"	2,444

Average force employed daily:

Below ground—Miners		41
" "	Laborers	48
" "	Boys	5
Above ground—Mechanics		6
" "	Laborers	14
" "	Boys	3
		117

* Newfoundland and the Dominion.

FINANCIAL STATEMENT—GOLD.

Mines Department for Twelve Months ended December 31st, 1879.

DISTRICTS.	RECEIPTS.			EXPENDITURE.			
	Rents.	Royalty.	Totals.	Return Rents.	Royalty Commission.	Salaries and Surveys.	Totals.
Caribou	$82.00	$ 165.45	$ 247.45	....	$5.81	$30.00	$35.81
Fifteen Mile Stream	....	4.47	4.47	....	....	....	....
Gays' River	....	14.88	14.88	....	.92	....	.92
Lawrencetown	....	9.15	9.15	....	....	....	....
Montagu	96.00	507.30	603.30	....	17.22	33.80	51.02
Oldham	136.00	579.40	715.40	14.00	27.54	10.00	51.54
Ovens	16.00	....	16.00	....	....	....	....
Renfrew	62.00	55.96	117.96	....	....	....	....
Sherbrooke	206.00	2,724.13	2,930.13	....	137.85	720.00	857.85
Stormont	12.00	1.78	13.78	....	....	....	....
Tangier	10.00	316.55	326.55	....	11.74	....	11.74
Uniacke	18.00	268.34	286.34	....	4.33	....	4.33
Wagamatkook	2.00	....	2.00	....	....	....	....
Waverly	10.00	51.95	61.95	....	3.09	....	3.09
Wine Harbour	4.00	32.40	36.40	....	1.62	....	1.62
Unproclaimed, &c	416.00	....	416.00	....	....	....	....
Prospecting Licenses	....	....	986.65	....	....	....	....
	$1,070.00	$4,731.76	$6,788.41	$14.00	$210.12	$793.80	$1017.92

OTHER THAN GOLD.

Mines Department for 12 months ended December 31st, 1879.

Counties.	Receipts.				Expenditure.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Return Licenses to Work.	Totals.
Annapolis	$120.00	....	....	$ 120.00	....	....	....
Antigonish	140.00	$50.00	$ 2.00	192.00	....	....	....
Cape Breton	280.00	150.00	15,411.05	15,841.05	....	....	....
Cumberland	80.00	50.00	6,584.04	6,714.04	....	....	....
Guysboro	20.00	....	....	20.00	....	....	....
Halifax	20.00	....	....	20.00	....	....	....
Hants	40.00	....	....	40.00	....	....	....
Inverness	120.00	25.00	....	145.00	....	....	....
Kings	20.00	....	....	20.00	....	....	....
Lunenburg	60.00	....	....	60.00	....	....	....
Pictou	240.00	50.00	18,843.86	19,133.86	....	....	....
Queens	20.00	....	....	20.00	....	....	....
Richmond	20.00	....	....	20.00	....	....	....
Victoria	60.00	....	....	60.00	....	....	....
	$1,240.00	$325.00	$40,840.95	$42,405.95			

ABSTRACT ACCOUNT.

RECEIPTS AND EXPENDITURE *for the 12 months ended December 31st, 1879.*

RECEIPTS.			EXPENDITURE.		
Licenses to Search Coal	$1,240.00		Return Rents........Gold	$ 14.00	
" Work "	325.00		Royalty Commission	210.12	
Royalty	40,840.95		Salaries and Surveys	793.80	
		$42,405.95			$1,017.92
Rents............Gold	1,070.00		General Expenses	3,860.02	
Royalty	4,731.76		Postage	62.88	
Prospecting Licences	986.65		Stationery and Printing	143.46	
		6,788.41			4,066.36
		$49,194.36			$5,084.28

REPORT

OF THE

DEPARTMENT OF MINES

NOVA SCOTIA,

FOR THE YEAR 1881.

HALIFAX, N. S.:
COMMISSIONER OF PUBLIC WORKS AND MINES,
QUEEN'S PRINTER
1882.

CONTENTS.

DEPARTMENT OF MINES.

REPORT

FOR THE YEAR 1881.

To His Honor the Honorable Adams George Archibald, *C. M. G.*
Lieut.-Governor of the Province of Nova Scotia, &c., &c., &c.

May it Please Your Honor:—

I respectfully present herewith to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled by him from official and other returns made to the Department of Mines, in the year 1881.

SAML. CREELMAN.
Commissioner of Public Works and Mines.

Halifax, February, 10, 1881.

REPORT

ON THE

MINES OF NOVA SCOTIA,

By EDWIN GILPIN, Jr., A. M., F. G. S.,

INSPECTOR OF MINES,

(Member of the North of England Institute of Mining Engineers.)

Office of Inspector of Mines,
Halifax, Feb. 26th, 1882.

The Hon. Samuel Creelman, M. L. C., M. E. C.,
Commissioner of Public Works and Mines:

Sir,—I beg leave to submit the following Report on the various Mining industries of the Province, carried on during the past year.

In addition to a detailed notice of the operations at each Mine, and the usual statistical tables, I submit a summary of the amount of minerals exported, not paying Royalty to your honorable Government.

The following summary shows, so far as I have been able to learn, the extent of the mineral production of Nova Scotia during the year 1881, compared with that of the previous year.

		1880.	1881.
Gold	Ounces	13,234	10,756
Iron Ore	Tons	51,193	39,843
Maganese Ore	"	223	231
*Coal raised	"	1,032,710	1,124,270
†Gypsum	"	128,528	107,133
†Building stone	"	3,540	6,638
†Barytes	"		40
Coke Made	"	13,125	27,871
Fireclay	"	75	401
Grindstones, etc	"	1,500	1,680

Through the kindness of the Collectors of Customs at the ports specified, I am enabled to give further details under this head at the end of the Report.

---

* Ton of 2,240 lbs.

† Quantities shipped. Amounts used in Nova Scotia unknown. No return sent of Plaster shipped from Baddeck.

COAL TRADE.

The total sales for the year 1881 amount to 1,035,014 tons, against 954,659 tons in 1880, being an increase of 80,355 tons.

The most noticeable points in the trade were an increase of 59,430 tons in the home sales, the returns showing 382,343 tons against 322,913 tons in 1880. The coal sent to the Province of Quebec amounted to 268,628 tons, an increase of 29,537 tons over the preceding year.

The sales to New Brunswick show an increase of 25,709 tons.

The sales to Newfoundland fell off 7,452 tons. A slight decrease is noticeable in the quantity exported to Prince Edward Island.

The amount exported to the United States was 9,695 tons less than in 1880.

The trade with the West Indies increased 9,455 tons.

The sales to other countries remained unchanged.

CUMBERLAND COUNTY.

The total sales of this County amounted to 171,079 tons, against 134,671 tons in 1880. A slight increase was made in the export to Quebec, and the home sales were enlarged. The sales to New Brunswick diminished somewhat. Those to other points remained as usual.

COLLIERIES.

JOGGINS.—At this mine the levels have been extended about 8 chains east and west. Two new balances are being driven. The pillars in the old east and west balances have been removed. The output of the mine has been 18,830 tons, against 13,350 tons during the previous year.

MINUDIE.—The Minudie Coal Mining Company have made preparations for re-opening their mine with a view to regular work during next year.

SCOTIA.—A few tons were extracted for land sale. A new slope is to be sunk to the westward of the present one.

CHIGNECTO.—This mine was transferred by the Cumberland Coal Mining Company to Messrs. McInnes and Gillespie in the spring, and since

that date every exertion has been made to establish a colliery capable of a large output. The operations to the rise of the old level have been continued. A new slope has been started close to the mouth of the level, and driven to the full pitch of the seam; it is now 600 feet long, and the winning levels have been turned away for the first lift.

The engine used for drawing coal is one formerly employed for the same purpose at the Nova Scotia Colliery, Pictou Co., and has been thoroughly overhauled. The necessary bankhead, blacksmith's shop, boiler house, etc., have been erected. A manager's house has been built, and several workmens' houses. The water now met in sinking is raised by a special steam pump. It is proposed to slightly change the course of the tramway, and to replace the present rails by others strong enough to allow the passage of the ordinary broad gauge locomotives and cars. It is understood that the greater part of this coal, which is said to furnish an excellent coke, will be used at the works of the Steel Company of Canada, at Londonderry.

SPRINGHILL.—In the spring a borehole was put down to a depth of about 600 feet, to the southeast of the east slope, and yielded a small supply of good water. In the fall another borehole was started about 2,000 feet south of the west slopes, and a large reservoir dug for holding a supply for the boilers during the dryer part of the summer. A tunnel has been started from the north seam to strike the overlying Thirteen feet seam, and is now nearly at the seam. A very heavy feeder of water was met, which gradually drained away. It is proposed to make a new winning on this seam by a pair of slopes to be driven down a short distance north of the west slopes. The large pump purchased from the Albertite Colliery will be placed in one of the present slopes to drain all the seams and to replace the special pumps now in use.

A new furnace has been built near the face of the workings in the North seam, and has the following dimensions: Height of grate above floor, 2 feet 2 inches; diameter of arch, 8 feet 6 inches; length, 36 feet; height of heated column, 100 feet. The levels have been continued into the area of the Mining Association, and new balances driven. The pillars on the west side of the slope have been brought back far enough to leave a barrier for the tunnel etc.

In the south seam the levels from the east tunnel, and the extraction of pillars near the west slope, have been continued. The slope driven from the lower level has been successfully holed into the west slope, and will be utilized for hoisting. About 120 tons of steel rails have been laid on the railway, a new circular screen built, and other surface improvements effected.

STYLES.—During the summer the beds on this property were traced to the west line and found to maintain a regular course. A slope was driven in on the main seam, and about 150 chaldrons of coal taken out. The explorations have proved a large amount of coal on the property, and it is to be hoped that its proximity to the Intercolonial Railway will lead to systematic mining at an early date.

The following section of the Styles and accompanying seams is from the explorations of the past summer.

	ft.in.
Coal seam	2.0
Strata	12.0
Coal seam	3.6
Strata	18.0
Styles seam	6.0
Strata	30.0
Coal seam	3.6
Strata	8.0
Coal seam	1.10

It is considered by those engaged in the explorations that the bands between the upper seams will thin out to the dip.

It is proposed to reopen the River Hibert Mine. Explorations were made during the summer on the Black areas by Mr. Jas. S. Hickman.

PICTOU COUNTY.

The total sales of this County during the year were 346,968 tons comprising 257,573 tons of round coal, and 89,395 tons of slack coal. The usual amounts of coke were made.

ACADIA.—During the past year the levels in the fifth lift have been driven to the boundaries, and the balances driven. Work has been commenced at the inside balances on both sides of the pit. The extraction of the pillars in the upper lift has been completed. A strong barrier has been left to protect the slopes, and the pillar between the railway and mine bords has been left to preserve the latter as a return from the new lift. The gauge of the pit railways has been changed from 4 feet to 2 feet 4 inches.

The Muesseler lamps, referred to in my last report, have been found very satisfactory, and I understand that they will ultimately be the only ones used at the Mine.

During the summer, a Guibal fan, 24 feet in diameter and 8 feet wide, was erected, with the necessary engines, boilers, drift, etc. The casing of the fan is of iron, a material which would appear to be well adapted for this purpose in our climate.

ALBION MINES.—During the past year the water in the main seam workings has been kept below the middle pump set. The deep seam remains closed.

In the spring, two slopes were started on the Third seam, of the following dimensions; width at top 9 feet, at bottom 10 feet, height 10 feet. The slopes are separated by a solid pillar of coal 30 feet thick, and are provided with a distinct system of ventilation, each slope having a furnace 7 feet wide, the base of the crown being 3 feet above the bars, and the length of upcast being 112 feet. The coal is raised by two pairs of 12 inch cylinder engines placed on the bank-

head framing, supplied by steam from a large portable tubular boiler, having 32 three inch tubes. The slopes have been extended for two lifts, and a colliery has seldom been won out in so short a time.

The Third seam presents the following section:

	ft. in.
Good Coal	7.9
Slatey band mixed with Coal	0.9
Good Coal	3.0
Total	11.6

Two shafts have also been sunk a short distance west of the slopes, to the McGregor seam, and the narrow work is already well advanced. The shafts are respectively 151 and 136 feet deep, and 12 feet by 9 feet 6 inches, and 9 feet square. The latter will be used as a furnace shaft. The engine is an upright cylinder, made on the colliery, and hoisting with a flat wire rope. The engine house is of brick, and all the fittings at bank are of a substantial character. No pumps have yet been put in either of the mines as the workings are very dry. The following is the section of the McGregor seam:

		ft. in.
Upper Bench.	Coal, good	3.3
	Slateband	0.1
	Coal, good	3.6
Lower Bench.	Coal	3.2
	Coal, good	2.0
	Slate, band	0.8
	Coal, good	1.6
	Total	14.2

The Back Mine's railway has been extended from a point near the Dalhousie pits, midway between the two winnings, and the screens of both are served from the same empty road. It is stated that the quality of the coals is similar to that mined from the main seam.

INTERCOLONIAL.—The levels in the new lift have been driven to the boundary on the north side, and in their extension to the east the coal was found to flatten considerably. The total length of the slopes is now 2,200 feet. In the bottom lift the dimensions of the pillars has been increased, and the size of the crosscuts diminished to meet the pressure. The extraction of pillars has been continued during the summer. The workings to the east of the dyke have been continued satisfactorily, and the returns in this part of the workings have been retimbered, etc.

Mr. Simpson has adopted the plan of watering his main south level. This materially relieves the horses, etc., and would furnish a certain amount of safeguard in the event of fire (see remarks on report of Royal Commission.)

In the No. 4 slope some twelve places were started during the summer, and worked continuously. Preparations have been made to sink a new shaft to the second seam, at a point a few yards north of the

office, so that the present yard can be utilized. The seam, it is expected, will be reached at a depth of about 150 feet, and a considerable extent of rise coal will be available, beside that which can be reached by inclines from the pit bottom.

The produce was 135,084 tons against 81,254 tons in 1880.

VALE COLLIERY.—During the past year narrow and pillar work was successfully carried on in the lower lift. In the pillar coal lamps were used with shot firers. A heavy feeder of gas was met during the summer coming from the roof and caused, it is believed, by the measures breaking up to an overlying seam. The work of sinking for a fresh lift of coal has been commenced. The capacity of the pump has been enlarged. The new Guibal fan has been erected and is now ready for the boilers, the building of which appears to have been delayed. The fan is 30 feet in diameter and 10 feet wide, and similar in design to the one erected some years ago at the Albion Mines. Upon the completion of this fan all the mines in the Pictou districts, except those opened this year, will have been furnished with this indispensible requisite for a systematic and safe method of maintaining ventilating currents. New winding engines have been procured, and it is understood that they will be erected to haul from the new lift.

The production was 90,215 tons against 86,522 tons in the previous year.

CAPE BRETON COUNTY.

The sales of coal from this County amounted to 516,852 tons against 380,848 tons in the preceding year.

The Home sales were 136,922 tons against 110 578 tons in 1880, an increase of 26,344 tons. The sales to Quebec amounted to 149,643 tons, an increase of 85,711 tons.

There was a slight increase in the sales to New Brunswick.

The sales to Newfoundland were 60,943 tons, against 68,132 tons in 1880.

The sales to Prince Edward Island show an increase of 8,617 tons; those to the West Indies increased 8,774 tons.

The sales to the United States were 93,119 tons, against 83,032 tons in 1880, an increase of 10,087 tons.

COLLIERIES.

SYDNEY.—During the past year the extension of the workings in accordance with the original plan has been continued. The face of the south side levels are now 60 chains from the pit bottom, and the bords are now being continued beyond the face of the Queen pit bords, an interval of 400 feet being left. The operations in the dips have been continued. It is proposed to connect the Queen pit drawing shaft with the fan drift, to give a larger upcast. It is also proposed to raise the

Queen pit water by means of a force pump. Four coke ovens have been built to supply fuel to the locomotives, etc. These mines raised 161,477 tons against a production of 143,254 tons, in 1880.

LINGAN.—During the past year dips were pumped out to give a lift of 350 feet, and levels turned to the south for thirty working places. The south levels in the upper lift have been stopped at the land barrier, and some of the pillars have been split. No work has been done on the north side this year, but should the state of trade warrant, openings could be readily made. The returns show a slight increase in the quantity of coal mined.

RESERVE.—The north slope was extended to within 20 yards of the boundary, and levels turned away to the north. The south slope has been continued 260 chains, and levels turned north and south. Pillars were taken out on Nos. 3 and 4 levels on the north slope. The workmens' houses have been repaired and other work necessary for the maintenance of the Colliery has been carried out. The produce of the Mine was 76,727 tons against 37,621 tons, in 1880.

INTERNATIONAL.—The workings have been extended on both sides of the dip slants, and to the rise from the south side levels. The slants have been extended to form a lodgement. On the surface the screens have been reversed to admit of more ready handling. A new carpenters' shop and weigh scale has been erected. The furnace has been improved by having a good air space provided at its sides and above.

LITTLE GLACE BAY.—During 1881 the north side levels and headways were advanced a short distance and three bords driven in the south side dip, and the working places of the previous year were continued. The returns show an out-put of 35,012 tons as compared with 24,371 tons in the previous year.

CALEDONIA.—During the past year the operations at this Mine have been confined principally to the pillars. The adit from the lake has been continued to the upcast, and some of the crop coal won by bords. The large pillars to the rise of the drawing shaft have been split. On the north side of the pit some of the larger pillars have been robbed by taking slices off their side, others have been split and drawn. The out-put of this Mine was 43,426 tons, against 18,589 tons in the year 1880.

ONTARIO.—The north side levels have been re-opened and bords turned away; the south levels have been continued, and room made for fourteen working places. A number five Cameron pump, with 3 inch column, has been put in, and can keep the works dry with three hours pumping per diem. Two new boilers have been put up, and the trestle work leading to the shipping shoots has been repaired. The system of carrying the coal to the wharf in large wagons has been abandoned, and the pit tubs are discharged directly into the vessels.

The ventilation has been assisted by adding 30 feet to the upcast, and preparations are being made to build a small furnace.

This year 15,117 tons were raised against 8,695 tons in the previous year.

BLOCK HOUSE.—The extraction of pillars has been successfully continued. The water brought into the pit by the falls having proved troublesome, it is proposed to put in a new pump. The produce was 61,108 tons against 48,475 tons in 1880.

GOWRIE.—The levels have been continued in the upper lift, and bords driven to the rise and the pillars brought back as usual. It is understood that this winter the slides, etc., will be put in the new shaft.

The returns show a production of 64,180 tons against 46,990 tons in 1880.

Little work was done at Broad Cove and Campbellton beyond keeping the mines open. At Little River the main shaft at the old colliery has been pumped out, and it is proposed, if the quality of the coal should prove good, to commence regular operations. Explorations have been carried on near Point Aconi, north of the submarine area of the General Mining Association, with a view to winning the seaward extension of the seams. A discovery of anthracite coal is reported from Adams' Lake, East Bay, Cape Breton County, but no details are yet known as to the value of the deposit.

GOLD MINING.

GENERAL REMARKS.

The total yield of gold during the past year was 10,756 oz. 13 dwt. 2 grs., against 13,234 oz. in 1880. The returns from unproclaimed districts amount to 2,436 oz. 9 dwts. 12 grs., an increase of 1,594 oz. 4 dwts. 23 grs. over the preceding year. The continued decline in the produce of several districts which have hitherto yielded uniform returns, has outweighed the increased production of several districts.

During the past year the extraction of quartz was more or less suspended in the following Mines, which were sold and being prepared for work on a more extensive scale, viz: Moose River, Satemo, Gallagher and Renfrew. A large number of other mines which have hitherto contributed to the returns, have been idle during part of the year, pending negotiations for their sale; among these may be mentioned, Strawberry Hill, Fifteen Mile Stream, Harrigan's Cove, Moosehead, Symonds, and several Mines at Oldham and Mount Uniacke.

That the interest in the Mines has not diminished is shown by the fact that in spite of the suspension of work alluded to above, the returns, not including a large amount of prospecting done at Chezzetcook, Beaver Dam, and other places, show a much larger number of days' work than in the previous year. Under these circumstances the outlook for the year 1882 is of a favourable character, as in it should be reaped the fruits of the large amount of preliminary work performed during the past year.

DISTRICTS.

Carribou.—During the past year little work was done at Carribou except on the Lowell property, on areas 373 and 374, and by R. G. McDonald & Company, who worked on area 350.

At Moose River the Foster property and mill, and later on the Cole areas, were purchased and are being put in shape for systematic work. Openings have been made on the Comstock, Sutherland and other lodes.

Mr. D. Archibald worked the Walton lode successfully during the summer, and Mr. Cole continued his operations. Mr. Touquoy also worked on area 131, and at other points. The total yield was 1,129 oz. 18 dwt. 13 grs., against 823 oz. 5 dwt. 19 grs., in 1880.

Fifteen Mile Stream.—Operations in this district have been principally confined to the property of the Messrs. Hall, who continued

their work on the lodes mentioned in my last report. Two new lodes were found twenty feet north of the Orion belt, 20 and 6 inches in thickness. Prospecting was done by Messrs. Grant, Walton, McDonald and others.

LAWRENCETOWN.—No work of any consequence has been done here last year.

GAY'S RIVER.—A return of 12 ounces was made in the spring, and no work has been performed since.

MONTAGU.—Work has been continued on the Rose lode. The fault which passed so much water into the works was a nearly flat-lying throw, dipping south, and shifting the load about three feet south. The new pumps were set to work, and the mine was drained in the early part of the year. The main shaft is now 280 feet deep. Operations have also been continued to the eastward, and pay quartz extracted.

On the Symonds' property work has been continued along the line of lode opened by them. Operations were stopped for some time during the summer to put the mill in complete repair.

Messrs. McDonald and Stutter prospected some areas lying south of the Rose area, and a 7 inch lode carrying gold was stated to have been found. Some work was done by Mr. Sutherland on his properties, and resulted in the finding of a lode 8 to 10 inches thick, part of which carried gold. Prospecting has also been successfully carried on by Mr. Foster, two lots from lease 105 of 29 tons yielding 20 oz. 7 dwts. During the fall a mill was put up a few yards east of the Symonds property by Theodore B. Hale, Esq., for the purpose of concentrating the tailings of the district. The process consists of drying the tailings at a low heat on iron plates, and by means of steam pipes; they are then sorted into two sizes and passed through automatic jigs, air being used instead of water. The resulting pyrites, free gold, etc., are forwarded to the United States for treatment. According to the returns there are about 9,000 tons of tailings resulting from mill work in this district.

WAVERLEY.—Work was continued during the year on the lode found and tested on the McClure property last fall. A little work was done by O'Toole and others, the total yield being 374 ounces from 535 tons of quartz.

A mill for the retreatment of tailings and the extraction of the gold from the sulphurets, etc., has been started here, but has yet not got fully into operation.

OLDHAM.—Comparatively little work has been done here this year. Prospecting was done on some new lodes by Mr. Baker after he ceased work in his large lode. The Messrs. Donaldson have opened a set of lodes a short distance south of the Mayflower mill, which promise to be valuable, and a good deal of preliminary work has been done.

RENFREW.—Operations here have been confined principally to the works carried on by Dr. Rae. He has opened the Brook, No. 2, and

Bain leads by shafts and levels, exposing good blocks of ore. It is expected that the commencement of regular mining will show steady returns, corresponding to the systematic manner in which the leads have been opened out

SHERBROOKE.—The returns from this district still show a great falling off. They amount to 5,277 tons of quartz, giving 2,580 oz. 2 dwts 20 grns., against 6465 tons, yielding 4,042 oz. 7 dwts. 9 grns. in 1880, and 9209 tons, yielding 7,389 oz, 17 dwts. 15 grains in 1879.

Operations have been continued on the Wellington property. The operations from the west shaft have been continued to the west. The proprietors propose to follow the pay quartz by means of an incline from the bottom of the present shaft, in order to avoid, as far as possible, the dead work now required. They propose re-opening the Wellington lead this winter. The consumption of coals by the engines has been materially reduced by an ingenious method of heating the feed water.

A wide belt carrying much quartz was opened on the Palmerston property, the work included the former workings of the company. Mr. Fraser proposes to build a tramway to his mill, and to thoroughly test the problem of treating low grade ores. A little to the north on the turn of the measures about 200 tons of quartz were taken out by an open cut by Mr. Anderson and others.

Work was also done by Mr. John Williams on the Gladstone. Messrs. Hattie and MacNab continued their operations on small but promising lodes in the eastern part of the district.

Work was continued at Cochran's Hill by Mr. Cumminger. From the official returns it appears that the yield from 659 tons of quartz was 252 oz 18 dwts., an average of 70 dwts. 16 grns., the highest being at the rate of 2¾ ounces to the ton. These lodes are characterized by large quantities of iron and arsenical pyrites, carrying considerable quantities of gold and silver, and the district is favorably situated for extracting and treating this class of ore. The attention of our miners is being turned to these ores, which merit much greater attention than has hitherto been accorded to them.

STORMONT.—The Gallagher property was transferred to the Gallagher Gold Mining Company, of Boston, who havec ommenced extensive works. The necessary buildings, stores, etc., have been erected, and a 10 stamp mill set up which it is expected will be started at once.

TANGIER.—Little work was done on Strawberry Hill during the summer. In the fall a prospecting shaft proved a belt of leads showing gold to the north of these hitherto worked. It is intended to further test them by an adit. The Forrest lead on Butler's Hill, and the McDonald lead near the dyke, are being prospected.

From a summary of the work done on the Forrest, Dunbrack and Wallace lodes on this property since March, 1867, it appears that 5,041 tons of quartz have been crushed, yielding 4,897 oz. 17 dwts. 19 grs., an average of 19½ dwts. to the ton.

The Satemo Gold Company, who purchased the Barton Washing property have made extensive openings in the Nugget and

Kent lodes. A large amount of quartz has been extracted pending the completion of their 10 stamp mill. This mill, erected by Messrs. Beckett and McDowell, presents some features new to this Province.

The Pittsburg Company have continued their operations in the Field and adjoining lodes; some lots of quartz were crushed from the property of the Company at Ecum Secum. Prospecting was carried on to the west of their property, and some leads found, which were stated to show gold.

At Mooseland a level was driven by Mr. Crossland to cut the large lodes north of the Irvine lode, and other work was performed.

UNIACKE.—Work has been continued steadily during the year. Mr. Blois continued working the nugget lode, his main shaft is now 200 feet deep. A little work was done on a small lode lying a few feet north.

On the Uniacke property Mr. Prince continued working the slate belt, lying west of the mill.

Messrs. Bayne and others did some work on the Westlake property. Mr. Foster, on the Prince of Wales area, reopened the Bunker lode, and another lode lying north of the main road. He put up a light 5 stamp battery driven by steam, which was worked at intervals during the summer. Work was also done on the eastern extension of the Nugget lode by Messrs. Davidson, Herbin, and others.

WINE HARBOR.—The work in this district has been confined to the Henry mine, which has been continuously and successfully worked. The crushing was done at the old water mill at the head of the harbor, which was refitted. The pay streak was found to dip east, at the rate of one in ten, and some of it ran ten ounces to the ton.

OTHER DISTRICTS.—The activity of the previous year has been maintained during the period under review, and the valuable character of some of the discoveries confirmed.

At Ecum Secum the Pittsburg Company sank a shaft in a 20 inch lode, and prospected a thick lead lying about 1000 feet south of the former one.

At Shier's Point, little work was done during the summer, as was also the case at Harrigan's Cove.

The Salmon River Mines have been steadily worked; the lode, so far as opened, varies from 4 to 6 feet in thickness. A water mill of 20 stamps has been built, and a boarding house to accomodate 60 men, beside other buildings required for mining operations.

The work at the Yarmouth Gold Mine has been discontinued.

A test was made in Boston of a few tons of quartz from Middlefield, Queens County, which yielded at the rate of 19½ dwts. to the ton; however, the work was not continued.

A little work was also done on Tancook Island, Chester Basin, Gold River and Indian Path.

Gold was reported to have been found at Black Brook, 12 miles south of Glengarry, Pictou Co., Lake George and Kempville, Yarmouth Co., Musquodoboit Road, Sheet Harbor, etc.

In my last report reference was made to the discovery of auriferous lodes at Chezzetcook. During the past summer prospecting has

disclosed a large number of veins, showing gold, and so far as can be judged from the work done the district promises to become valuable.

In Mr. J. H. Anderson's property seven lodes from 5 to 18 inches in width were found to carry gold. Similar veins have been proved on the property held by Dr. Cogswell and others. On the McLeod property a belt of promising lodes has been cut, and a four foot lode carrying gold. It is intended by the chief operators to put up a mill during the winter, to further test the capabilities of the district. Few of our mining districts are more favourably situated, as vessels can lie within a mile of the mines.

COPPER.

During the past year operations in the ores of this metal present few new points of interest.

Discoveries were reported from Hopewell, Pictou County, Spring Hill, and Margaretsville, Annapolis County.

At the Coxheath property, near Sydney, one shaft has been sunk 60 feet, and about 50 feet of levels driven east and west, showing yellow and purple ores in paying quantities. A second shaft has been started, 700 feet to the west, and is now 25 feet deep. A number of trenches have been dug exposing the lode at various points. The necessary shaft, boarding and other houses have been built. Employment has been given to about 50 men. Should the present encouraging show of ore continue, it will doubtless prove a valuable mine, and mark the commencement of a new mining industry in the Province.

SILVER, LEAD, ETC.

During the past fall a little more prospecting has been done in the Higgins' silver ores. At Smithfield, Colchester County, openings were made on deposits of galena said to carry remunerative percentages of silver.

Other localities where silver lead ores have been reported from are St. Ann's, Cape Breton, Arichat, East River of Pictou, Nine Mile River, Hants Co., and Salmon River, Cape Breton County. At the last named locality the ore appears filling the beds lying at the junction of the carboniferous with older strata. A large sample has been taken out and sent to the United States for a test, but I have not learned what the results were.

IRON MINING.

Operations have been continued at the mines of the Steel Company of Canada, and present no new features of interest. The amount of ore mined was 39,588 tons, and 975 tons of ankerite were quarried for flux.

Discoveries of Specular ore were reported from Battery Hill, Pictou Co., and from the West River of St. Mary's. At Boyleston, Guysboro' County, Messrs. D. M. Fraser and A. Cumminger have opened a series of veins of specular ore, of unusually good quality, varying in width from two to four and a half feet. About 255 tons have been sent to Londonderry. The mine is favourably situated for shipping, and the quality of the ore is such as should command a market in the United States. About 12 miles west of Guysboro', at Erinsville, a similar deposit, said to be 15 feet wide, has been sold to the Crane Iron Co. of Philadelphia, who are making preparations for developing it.

A fine quality of red hematite has been found at River Philip, but no search has yet been made for the ore in situ.

In Cape Breton, further work has been done in the Moseley red hematite at East Bay and the bed, by my own measurements, was found to have increased in thickness to 13 feet in the eastern openings. The proprietors purpose taking out a few hundred tons for a trial cargo.

A deposit of red hematite was partially tested at Loch Lomond by Mr. Mosley. The following analyses shows these ores to be of high grade:—

	East Bay.		Loch Lomond.
	Steel Co. of Canada.	Geo. Sur.	Geo. Sur.
Peroxide of Iron	82.75	85.037	83.645
Protoxide of Iron	....	....	7.640
Phosphorus	.070	.014	.033
Sulphur	trace.	.075	.078
Manganese oxide	.26	....	.285
Moisture	1.30	....	.341
Alumina	1.55	....	....
Lime	1.20	....	....
Magnesia	.66	....	....
Insoluble residue	12.80	....	7.768
Metallic iron	57.92	59.526	64.494

These deposits are favourably situated for mining, and at short distances from shipping places. From their analyses they should be

adapted for Bessemer use, and will ultimately furnish very valuable supplies of ore to local furnaces.

The bed of red hematite found at Smith Brook, has been further prospected and found to have a width of 20 feet.

A bed of red hematite 15 feet wide has been found within two miles of the Pictou coalfield. Analyses have shown it to yield 44.50 per cent. of metallic iron with small amounts of sulphur and phosphorus. The quality of the ore is well adapted for smelting, and it is to be hoped that an effort will be made to utilise it for this purpose. As it is much nearer shipping and fuel than any deposit hitherto found in that district good grounds appear for the success of such an enterprise.

MANGANESE.

During the past year operations have been continued at the Tenny Cape Mines by J. W. Stephens, Esq., who also opened a new mine at Cheverie, yielding a very fine quality of ore.

On the North River of Truro Messrs. McLellan and Archibald prospected for the source of the rich boulders found there. Some veins have been found, but regular work has not yet been commenced. About 15 tons of very good ore were obtained, part of which has been shipped.

Prospecting was also done at Pembroke. The Hon. E. T. Mosely has proved that Cape Breton is to be added to the list of Manganese producing districts. During the past year he has opened a mine in the farm of Murdoch McCuish, and another on the property of Norman Morrison, Glenmore, Loch Lomond. About 70 tons have been shipped, principally to the United States. The ore is described as suitable for glass, chlorine, and ferro manganese. The following analyses will show its quality, and were made in the laboratory of the Geological Survey, by Mr. C. Hoffman :

No 1.	After drying at 100 C. peroxide of Manganese	..81.52 per cent.
No. 2.	" " " "	..88.98 per cent.
"	" " " Iron	.. .21 per cent.

All the samples analysed are returned as very free from iron.

During the past year the prices of Manganese have risen very much, owing I believe to the exhaustion of the continental deposits yielding the higher grades of ore. The importance of this increase in value may be learned from the fact that first class ore from Nova Scotia has been sold in Boston for $120 per ton. In this Province it is found associated with limestones of lower carboniferous age, and there can be little doubt that it exists in large quantities, as specimens are found at every point where these measures occur. Should the present demand continue there is no doubt that in a few years it will form an important part in our list of mineral exports.

FIRECLAY.—The extraction of fire clay has been continued by Messrs. McIntosh & DeWar, of Stellarton.

PETROLEUM.—The borings spoken of in my last report have been continued during the season, but the results have not been made public.

ACCIDENTS.

During the year 1881 the following fatal accidents occurred:

1. January 20.—John Blue, deputy, Springhill—stepped on wrong road while working on back balance, and killed by cage.

2. March 29.—Robert Cook, trapper, Sydney Mines—riding on engine plane.

3. April 9.—John Nash, collier, Acadia Colliery—barring off coal from pillar.

4. October 6.—Robert Bigney, cage runner, Springhill—killed by breaking of rope on cage.

5. Nov. 23.—John Nicholson, collier, Vale Colliery—caught by door in slope, while riding on rake.

6. Dec. 16.—Nobel Farnen, driver, Londonderry Iron Mines—killed by box running away on incline.

Among the non-fatal accidents, four were caused by ignition of gunpowder. Two of these happened at the Albion Mines. In one case the fuse of the charge had gone out, the miner returned and relighted it, but it ignited the charge almost immediately. The other injured two men, and was caused by the explosion of a can of powder in the hands of a man who was charging a hole with his lamp in his cap. The explosion was caused by a spark from the lamp, and the escape of the men from instant death was providential.

Another, reported from the Sydney Mines, was stated to have occurred during the use of a copper needle by a man taking down stone.

A man was burned at the Vale Colliery while measuring out powder with his lamp in his cap.

The same man and his partner, a few weeks after, were burned by the ignition of powder in a hole he was charging, it is supposed from the tamping bar.

A man was injured at the Joggins Mines by signalling away the cage before the tub was properly secured.

Two shiftmen were slightly burned at the Vale Colliery by gas from a fall of stone in the returns. This occurred a few hours before the heavy feeder already referred to.

REPORT OF ROYAL COMMISSION.

The preliminary report of the Royal Commission on Mining Accidents contains much useful information, and should be read by all who are interested in coal mining. The following summary of the results of their work will prove interesting.

Many differing opinions were expressed by witnesses on the subject of laying out the workings of collieries. A great majority of opinions are in favour of working out an upper seam before taking out the one immediately underlying it, but that with regard to safety it is not a matter of much moment, unless the interval between the seams be very small. The actual mode of working in England, though somewhat modified locally, may be broadly divided into bord and pillar, long wall, and the Yorkshire and South Wales system of "banks," where the roof is allowed to fall within rooms of comparatively limited extent.

Strong evidence was given in favour of the safety of well planned longwall workings, both as regards facility of ventilation and lessened liability to accidents from falls. It was admitted that under certain circumstances seams cannot be advantageously worked on this system, and the Scottish teachi g is that its benefits are limited to seams not exceeding 5 feet in thickness. This, however, is at variance with some English and Welsh examples. Some observers state that in their opinion a rapid working of longwall causes a large efflux of gas, others again believe that no serious danger is to be apprehended from this source, and many of the most experienced managers lay great stress on the superior safety of a rapid advancement of the longwall faces.

The Commission report that great progress has been made in ventilation during the last fifty years, and the proposed introduction of the steam jet in 1851, and the rapid extension of mechanical ventilation since 1862, have led to experimental and practical improvements which have resulted in the employment of volumes of air far in excess of the quantities once deemed sufficient.

Well planned and isolated furnaces in deep pits are found to give the most powerful currents. Thus, at South Hetton and Murton 380,000 and 440,000 cubic feet are obtained from three furnaces and twelve boiler fires. At the deep pit, Rosebridge, 235,000 cublic feet of air per minute are circulated by two 9-feet furnaces. It must be remembered that such furnaces should be continuously fed, and that no gas be allowed to pass over the fires. To meet this latter requisite the introduction of furnace air drips has become customary.

Many managers of collieries having deep, dry shafts prefer this method of maintaining the air currents, but the evidence of numerous witnesses shows that the volumes of air circulated by mechanical ventilators, varying with the dimensions and speeds of the machines, equal those of the largest furnaces in ordinary practice, and form a strong argument for the still more extensive use of these powerful and easily regulated air motors.

The falls of roof and sides cause a large proportion of fatal accidents, and it must be remembered that this is one of the most difficult

class of accidents to guard against, for besides the propping, walling, and packing, the nature of the roof, of the coal itself, the quality of the floor, the system of working, the method of cutting, all present difficulties and require special attention to be devoted to the effects they produce on the stability of the material surrounding the miner.

In the longwall system of working, the use of pillars of crossed timber or stone, "chocks," has become general, and more attention has been paid to pack walls. The introduction of cast iron props did not prove permanent. In Durham and Northumberland, where accidents under this head are comparatively few, the setting of the timber at the faces of the coal, and the drawing of it when done, are entrusted to special officials, and the miners are required merely to secure their working places temporarily. On the other hand the general system in England, Wales, and Scotland, is to make the colliers secure thei own working places, both employers and workmen asserting that th nature of the roof and other circumstances will not permit of th Durham system being adopted.

The issue of gas from coal seams is one causing many serious acci dents, and one upon which accurate information is much needed, ther being no definite knowledge as to the condition in which the gas ex ists in the coal. If gas be regularly emitted from fresh faces of coa it may be dealt with by vigorous and well directed ventilation. Th accumulations caused by lack of ventilation, or its interruption b partial openness of goafs, falls of roof, etc., are referred to throughou the evidence as sources of accident to be guarded against only by car and unceasing vigilance. The evidence on the subject of sudden out bursts of gas, which have become alarmingly frequent of late years i English and Belgian pits, as their depth increases, is highly importan The immense volumes of gas thus unexpectedly poured into the work ings have again and again overpowered for a time the stronge ventilating apparatus in use. There appears to be good ground f concluding that the daily examinations of the working places a properly carried out by the colliery officials, although in some cases tl opinion was expressed that too long an interval was allowed betwe the time of inspection and the entry of the men. Many of the exper preferred the Davy lamp for gas testing, but the Ansell indicator w pronounced useless.

The evidence shows that the variations of the atmospheric pressu exercise an undoubted effect on *accumulations* of gas in mines. Fe observers believe in any important influence of atmospheric pressu on the issue of gas from solid coal, stating that the amount of g thus evolved produced no effect on the air currents. At ma collieries, when the barometer is falling and when the wind is souther extra precautions are taken by increasing the speed of the fan or t supply of coal to the furnace, though few of the witnesses believe th there is any close relation between the atmospheric pressure and t occurrence of colliery explosions, especially among some of the view from the north of England who have closely watched these phe mena and are of opinion that such connection has not been made o

On the influence of coal dust on colliery explosions, much importa information was elicited.

Mention appears to have first been made by Faraday and Lyell

1845 of the influence coal dust in mines might exert on the magnitude and extension of explosions of fire damp. Some experiments were made by M. Verpilleux in 1867, and he came to the conclusion that it played an important part in colliery explosions.

The subject was more fully examined into by M. Vital in 1875 in connection with an enquiry into the cause of an explosion in a part of the Champagnac Colliery, where no fire damp had ever been detected.

Shortly after Mr. W. Galloway began a series of valuable experiments on the influence of coal dust in colliery explosions, and laid the results before the Royal Society in two papers in 1876 and 1879. Mr. Galloway in the first paper arrived at the conclusion that a mixture of air and of a certain coal dust which had been subjected to chemical and practical experiment was not inflammable at the ordinary pressure and temperature of the air, but, that the presence of a very small proportion of fire damp, too small to be detected by a Davy lamp, made the dust inflammable and caused it to burn freely with a red smoking flame. From this it was deduced that an explosion originating in any way in a dry and dusty mine may extend to remote parts of the workings where the presence of fire damp was unsuspected.

In the second paper it was shown that the return air of a mine emitting gas, as in the Llwynypia Colliery (where the return was estimated to contain approximately 2 to 2½ per cent. of fire damp) may be rendered inflammable by the addition of coal dust. Experiments were also detailed by which it appeared to be demonstrated that the flame of an explosion of fire damp might be extended for some distance even in the absence of fire damp by means of the dust raised and suspended in the galleries by the concussion of the air.

A valuable contribution to the literature of the subject has been made by Professor Abel in his report on the Seaham explosion. The following are the conclusions he arrives at:—

"That coal-dust in mines not only promotes and extends explosions in mines, by means of the rapid inflammability of the finely divided combustible, and of the readiness with which it becomes and remains suspended in air currents, but that it may also be itself readily brought into operation as a fiercely-burning agent which will carry flame rapidly as far as its mixture with air extends, and will operate even as an exploding agent, through the medium of a proportion of fire-damp in the air of the mine, the existence of which, in the absence of the dust, would not be attended by any danger. Although the explosion which may occur through the agency of a non-combustible powder in the manner described, may be of very mild or feeble character in the first instance, it may be almost at once increased in magnitude and violence by coal-dust which the first ignition will raise and bring into action. The proportion of fire-damp required to bring dust in a mine into operation as a rapidly burning or an exploding agent, even upon a small scale, and with the application of a small source of heat or flame, is below the smallest amount which can be detected in the air of a mine, even by the most experienced observer, with the means at present in use, as has been already demonstrated by the experiments of Mr. Galloway. In the complete absence of fire-damp, coal-dust exhibits some tendency to become inflamed when passing a very large lamp flame at a high velocity; if exposed to the action of a large volume of flame, such as produced by the explosion of freely-exposed gunpowder or gun-cotton, it exhibits, in addition, a decided tendency to carry

or propagate flame. But it can scarcely be maintained that the air of a mine in which the coal gives off gas at all can be at any time free from fire-damp; and as the existence of very small and unsuspected quantities of that gas in the air of a mine may suffice to bring about the ready propagation of flame by coal-dust, and thus to develop violent explosive effects, it would appear needless to assume that coal-dust may, in the entire absence of fire-damp, give rise to explosions, even of only limited character in coal mines, in order to account for casualties which cannot be ascribed to the existence of accumulations or sudden outbursts of fire-damp."

It has also been found by the Professcr that finely powdered slate assisted materially in "extending" the range of fire-damp explosions.

An extension of these experiments has shown that in air, travelling at a velocity of 600 feet per minute, different coal dusts, suspended in the air, containing from 2 to 2.75 per cent. of fire-damp, caused explosions. At a velocity of 100 feet per minute, the same results were obtained with air containing only 1.5 per cent. of gas, and ignitions of dust extending to considerable distances were observed in "air" containing much smaller proportions of gas.

Mixtures of fire-damp and air approaching explosive proportions were instantaneously ignited by a lamp when they contained only a few particles of dust in suspension, and it was also found that the dust of substances not inflammable was capable of producing these effects.

The evidence on the subject of removing or watering the dust of dry mines was not conclusive. In some Welsh mines the watering of the working places has proved beneficial, but there are many practical objections, among which may be mentioned the tendency of the bottom to swell when wet.

Some few experienced managers expressed an opinion that every mine might be sufficiently ventilated to allow of open lights. Some good authorities unite in saying open lights lessen the danger from falls, that the men are better educated to be cautious, and that ventilation is sure to be better attended to. The preponderance of the evidence however seems to be in favour of the use of safety lamps when anything approaching dangerous amounts of gas begin to be given off, and it is not to be denied that their employment becomes necessary in mines liable to sudden outbursts, or where an interruption of ventilation may cause an accumulation of gas.

The Davy lamp is preferred by many, especially for inspection by the firemen. One manager stated that he placed implicit confidence in it, and had long used 5,000 to 6,000 of them daily without being able to trace any accident to them. Others again claim equal merits for the Clanny; some however were found to admit its imperfections. In Yorkshire, where sudden outbursts of gas are met, the property of going out in gas has secured a preference for the Geordie, but witnesses admitted its dangerous condition when the glass was broken. At a few places the Mueseler lamp has been used for twenty years, and the testimony in its favour is clear and unanimous on the score of safety and economy. The evidence shows that the use of unprotected Clanny and Davy lamps, in an explosive mixture moving at a rate exceeding 6 feet per second, is exceedingly dangerous. The majority of the witnesses declared as a rule it is practically impossible to work

mines without powder. While some would forbid the use of powder when safety lamps are used, many of experience hold that that in mines giving off gas it does not follow that in all cases where such lamps are used it is unsafe to blast. Many witnesses consider that restrictions may be desirable, either that the shot firing should be entrusted to officials, or allowed only in certain parts of the work or at night when the men are out of the pit. The final conclusion arrived at by the Commission will be awaited with great interest.

There is one point elicited by the evidence of the Commission which I wish to bring particularly to your notice, and to the consideration of those engaged in conducting the operations of the collieries in this Province giving off more or less gas. From the results of experiments detailed before the commission, it appears that dangerous ignitions of coal-dust readily occur when percentages of gas, undetectable by ordinary tests, are present. In view of this evidence, which I believe has not been contradicted, it will be seen that the use of powder in mines giving off gas even in small quantities, may under the conditions readily occurring in practice, give rise to serious explosions, when to all ordinary observation the mine may previously have appeared to be in good order.

It will therefore appear that the question of the use of gunpowder should be confined by the careful manager within narrower limits than those laid down by the Act. It would be improper to attribute all explosions to the use of gunpowder alone, but it is a significant fact that in the West Riding of Yorkshire, at a number of the largest collieries, the use of powder has been discontinued, and it appears from the last returns that the district, formerly noted for disastrous accidents, recorded but one death from explosion of gas.

ACCUMULATION OF GAS.

The accumulation of gas in working places, either by defective ventilation, or by the discharge of pent-up blowers, has been frequently observed. There is, however, a point in connection with the accumulation of gas in goaves which merits attention. It is known that old workings which were free from gas have been found to hold as much as 30 per cent. of fire-damp which must have been introduced from without. This fact cannot be explained by the law of diffusion of gases, for such gases accumulate in goaves, pot-holes, and, separate from air currents, at the top and along the sides, where they are of varying speed and intensity. It would appear that the Berthollet law, which holds good for gases in equilibrium, and is based upon the attraction of molecules of gases of various composition, does not apply to moving gases, and this idea is supported by some recent researches.

In 1860, Mr. Clerk Maxwell came to the conclusion that all gases consist of innumerable minute particles capable of moving in every direction. Clausius in 1874 arrived at similar conclusions, and enlarged on the effect produced by currents causing lighter or smaller particles to separate from those which were heavier.

In 1879, Mr. Crookes, in his celebrated lecture on "Radiant Matter," showed that by the impact of gas molecules on certain substances phosphorescence was produced; that their impact could produce heat

enough to melt platinum. He showed that they moved in straight lines, behaved like solid bodies, and that all these properties were irrespective of the composition and specific gravity of the gases. From his experiments it will be seen that molecules of comparatively lighter gases will, by the innumerable blows they receive in a current of gases, be constantly pushed aside, while the heavier particles continue their course. From this it follows that motion favours a separation of gases, which is changed to a diffusion by attraction when rest follows. Thus, the in-take air gradually takes up particles of fire-damp and as it passes along continually buffets them to the high side. When, therefore, such currents of air skirt goaves or old workings, there is an opportunity offered for the already partly disassociated gas to enter them and become diffused in a state of comparative rest.

Dr. Gurlt, lecturing on the above subject before the German Institute of Mining Engineers, advocates the use so far as possible of dip ventilation, as best adapted to oppose the light gases and sweep them into the closed levels leading to the upcast. I may mention here the bearing this law has practically on two points, first, the impropriety of having currents of air skirting goaves, and the avoidance of abrupt turns in the currents as at the face of rise drifts, etc., for at these points the disassociation would be greatest, leading to the combustion of more gas in the lamps and the retardation of the current. Other points also arise in which the study of this principle will be found useful as assisting in the solution of the problem of getting the best work possible out of the air currents.

Experiments made by M. DeRossi with the microphone, tend to show that outbursts of fire damp are preceded by slight microseismic undulations and noises appreciable only by the microphone. Should further observations show that the variations of the barometer over large surfaces of the earth and earth movements can be detected by their effect on this instrument it may become an important aid to the operations of coal mining.

PRESSURE OF GAS.

Mr. Lindsay Wood recently communicated to the Newcastle Mining Institute the results of a set of interesting experiments on the pressure of gas in coal seams.

The writer states that having had his attention directed to the frequency with which blowers of gas escaped under pressure from coal workings, he was desirous of ascertaining if the gas existed at a high pressure in the solid coal. Also, of finding out what was the rate of escape, and its duration, so as to afford data for the comparison of the effects produced by working mines by single and double shifts.

To this end five distinct sets of experiments were made, and holes bored to various depths in the coal in the collieries of Elemore, Hetton, Eppleton, Boldon and Harton. These holes were plugged and gauges applied, and the presence of gas at very high pressure was speedily shown.

The depth of the seam at Elemore was 750 feet; at the other collieries from 1,215 to 1,268 feet.

The maximum pressure at Elemore in a fourteen feet hole was 28 lbs. The pressures at the other collieries ran as high as 461 lbs. to the square inch, being equal to 84 per cent. of that due to a column of water the same height as the depth of the seam from the surface. It was much less at some of the other mines, and bore a relation to the length of time the seam had been worked as at Elemore, which had been worked fifty-three years, only $8\frac{3}{4}$ per cent. was recorded.

It also appeared that under similar conditions of cover the pressure varied as the square root of the distance of the end of the bore hole from the face of the coal.

The amount of gas given off per hour, per square foot of coal, as exposed by the bore holes, varied from ·243 to 3·889 cubic feet. It is also noteworthy that the results show that there is no connection between the variations of the barometer and the temperature of the air, and the quantities of gas evolved.

It is to be hoped that these valuable experiments will be continued, to afford data on certain points of interest, such as the effect of the water of the strata on the pressure of the gas, the composition of the escaping gas, the deepening of the bore holes to determine if at any distance from the face the gas exists in the liquid form. In my last report, I mentioned some of the arguments which have been brought forward in support of the view taken by some mining authorities in favor of the existence of fire-damp in a consolidated form. Under ordinary circumstances, the resumption of the gaseous form by the gas would not be attended with directly injurious effects, as it would be a gradual process proportioned to the lessening of the pressure by the miner's work. However, should it exist in any portion of a coal seam where pressure was maintained by a section of unusually strong coal, etc., circumstances might readily arise permitting it to exercise explosive force resulting in the breaking away of coal and possible explosions at lamps. The instance is recorded of such an explosion of carbonic acid, confined under great pressure, in a Belgian mine.

GAS CONSUMER.

Trials which have been made of the Guido Kœrner fire-damp consumer would show that it is an invention of some practical value and not merely noteworthy for its ingenuity. Mr Kœrner, finding that the metal palladium possessed the property of decomposing fire-damp rapidly at a temperature of about 480 F, which is below the red heat required for its ignition, has constructed a lamp, of which the following description is given. The apparatus consists of an oil reservoir having five burners, to the upper end of each of which is attached a plate carrying a shell of asbestos impregnated with platinum and palladium. The over-heating of the reservoir and asbestos shells is prevented by fine wire netting. An aperture in the top of the asbestos shells, in which the combustion of the oil is effected, permits the entrance of the necessary air. Trials have been made at several German collieries, and have proved that it rapidly consumes gas so as to allow of work with open lights in uprises which could scarcely be entered before. From these experiments it has been found that it consumes gas at the rate of 30 cubic feet per minute.

In Westphalian mines it is said to be now a common practice, instead of driving the ordinary rise heads, etc., with their concomitant difficulties of gas and bad air, to make a preliminary holing by means of rotary hand drills. The Hussman drill, which is worked by two men, has a 13-inch bit, and the core is split by a smaller bit. Four men, working by turns, including all time for stoppages, made from 34 to 36 feet per shift. Similar results have been obtained from the Munscheid drill. It is urged that although the use of these machines does not suffice for ventilation or the removal of large quantities of fire-damp, yet the subsequent work of driving the headways is done with greater safety and lessened expense.

Fleuss' patent noxious gas apparatus was satisfactorily tested at the re-opening of the Maudlin seam Seaham Colliery. The apparatus consists of a rubber bag worn on the back, and connected with another placed on the breast. At the bottom of the bag on the workman's back is a cylinder containing enough oxygen gas under pressure to supply four hours' respiration. The upper part of the bag contains the filtering apparatus, which absorbs the carbonic acid gas exhaled by the wearer. The remaining air is enriched by the oxygen, and breathed again and again until the oxygen reservoir is exhausted.

MECHANICAL VENTILATORS.

I give the following table, condensed from the Report of the Committee on Mechanical Ventilators, appointed by the North of England Institute of Mining Engineers, in 1878, and published in the last volume of their transactions, as it will prove interesting to those contemplating the erection of mechanical ventilators in this Province. The results given are those obtained from the machines as far as possible working under ordinary conditions, and reference to the report itself is recommended for full details. While the subject is alluded to here, I would remark that the tendency in Nova Scotia is, in my opinion, to erect ventilators which, while answering all requirements at the present moment, are too small in view of operations calculated to extend over a number of years :—

TABLE OF EXPERIMENTS WITH VENTILATING APPARATUS.

Number.	Decription of Ventilator.	Situation.	Dimensions of Ventilator. Diameter.	Width.	Theoretical capacity.	Diam. of Inlet.	General Results. Volume of Air.	Mean W. G. Drift Door.	Usefuleffect Drift W. G.	Effective Areas. Down-cast.	Upcast.
			ft. in.	ft. in.		ft. in.		inches.	p.c.		
1	Guibal	Hilda Colliery, South Shields....	50 . 0	12 . 0	....	15 . 0	108,422	3.30	40.00	124.7	107.69
2	Waddle . . .	Celynen Col., S. Wales, ...	45 . 0	inlet 6 . 6 periphery 1 . 5	....	15 . 0	163,312	3.08	52.79	293.48	254.46
3	Schiele....	Car House Colliery, Rotherham..	9 . 6	inlet 3 . 2 periphery 1 . 8	....	8 . 0	106,570	2.03	49.27	99.2	....
4	Do.	Cotton Wood Colliery, Barnsley..	12 . 0	2 . 1	....	....	157,176	1.91	46.12	313.5	170.65
5	Guibal	Pemberton Colliery, Wigan......	46 . 0	14 . 10	....	13 . 0	246,509	1.85	52.95	408.13	465.24
6	Do.	Cannock Wood Coll., Staffordshire	40 . 0	12 . 0	....	14 . 0	170,581	1.46	47.95	225.2	191.48
7	Lemielle ..	Page Bank Colliery, Durham	chamber 22 . 6 drum 15 . 0	height 32 . 0	at 9.9 strokes 108,900	....	47,307	1.37	23.40	....	....
8	Struve	Cwn Avon Coll., South Wales....	2 pistons 18 . 3	stroke 7 . 0	at 6.5 strokes 47,827	....	43,793	5.11	57.80	80.05	104.78
9	Nixon	Navigation Coll., South Wales...	2 pistons 30 ft. long 20 ft. high	stroke 7 . 0	at 7.19 strokes 120,790	....	72,595	2.74	45.91	122.28	66.00
10	Roots.....	Chilton Colliery, Durham.	2 drums 25 . 0	13 . 0	at 16.71 revol. 96,918	....	89,772	3.29	47.84	....	....
11	Cooke.	Hutton Henry Colliery, Durham..	2 drums 15 ft. casing 22 . 0	....	at 17.92 revol. 80,640	....	54,190	1.12	37.33	78.81	158.79
12	Goffint....	Horloz Colliery, Liege..........	2 pistons 13 . 2	stroke 10 . 7¾	at 9.25 strokes 53,020	....	36,286	.71	25.79	153.7	127.67

FALLS OF ROOF, ETC.

In our coal mines as well as in all other coal producing countries the number of accidents from falls of roof and sides forms a large percentage of the total number of accidents.

This subject has been enquired into by a committee of the Mining Institute of Scotland and their recommendation is as follows: That in their opinion the north of England system of timbering by deputies is not satisfactory, and that they prefer the plan that in each seam worked at a colliery there should be a rule laid down by the manager stipulating the extreme distance between the props, etc.

In Nova Scotia, it has been left chiefly to the colliers, under the direction of the chargemen. This system, while working well in mines having a roof of uniform quality, or one secured naturally to some extent by casting on one of the upper plies of the coal, is not so satisfactory when applied to treacherous roofs and thick seams. The passage across the working places of lypes inclining obliquely to each other, and the presence of "kettle bottoms," demand a caution and experience which the collier gains only by long experience. In mines presenting these dangers the various chargemen should omit no opportunity of pointing out to the less experienced workmen the wedges, etc., formed by lines of fracture both in the roof and coal, and the support they should receive until the workings pass the line of danger, etc. It is sometimes observed that the supports are carelessly put in, and not placed so as to meet the line of greatest pressure. The use of cap pieces is frequently abused, for in many cases they are so placed as to form little more than wedges splitting the trees. Attention to these small details has much to do with the safety of the working places, and indirectly affects materially the cost of the coal, as a fall of roof frequently costs for its removal many times the value of the coal formerly supporting it.

ELECTRIC LIGHTING OF MINES.

The subject of electrical lighting of our coal mines has been advanced another step during the past year. Full information as to the latest results effected was given by Mr. A. Jamieson before the British Association for the Advancement of Science. He detailed the results of the practical trials made at Peaseley and Earnock Collieries, which proved successful, and served the important purpose of pointing out some practical defects. He showed working models of strong lanterns encasing Swan's lamps, and of airtight contact makers, for preventing the spark, which always takes place on disconnecting lamps or wires, from causing danger in a fiery pit. It was shown that the plan of joining a number of Swan lamps in single parallel with a self-exciting Gramme or Siemens, or other form of dynamo-machine, was neither the most convenient nor economical, from the fact that the lamps require to be made of a slightly decreasing resistance in proportion to their distance, and, without a costly and delicate current regulator there was risk that when a number were extinguished, of injuring those remaining. He said that the plan of introducing resistance, equivalent to that of the lamps turned off, amounted to throwing away so much power. Several plans were discussed which were, in Mr. Jamieson's opinion, well adapted for joining up lamps.

It was stated that with the experience gained at the Peaseley Colliery, which was considered a very safe one, arrangements were being made to carry out the lighting by electricity of Risca pit, one of the most dangerous in England.

A self-contained portable Swan lamp was shown, which could be kept lighted by two cells of Faure's secondary battery, weighing 10 lbs., for six hours, with an illuminating power of two candles. The cells could be charged afresh by attaching it to a dynamo-machine placed in any convenient part of the pit, so that the lamps need never be taken to the surface.

The introduction of the Faure secondary battery marks an important step in the adaptation of electricity, not only to mines, but for many domestic and public purposes. Sir W. Thompson states that the waste of stored energy is unimportant, and that the power remains practically intact for several weeks. By means of this battery, the dangers attending the employment of conducting wires can be avoided and the miner could carry a store of electrical energy in his lamp, as he now carries oil, sufficient for his shift, and allowing him the advantage of being able to place the lamp in any desired position.

The question of the adoption of electrical lights for the working faces of collieries has yet to pass the test of practical use. Should this point be satisfactorily settled, then the comparison of cost between them and oil lamps will practically decide their general introduction.

At present, however, electricity is found to be extremely useful in lighting halls, docks, etc., and would be a very good exchange for the dangerous parafine lamps, fire-baskets, etc., now used at our collieries for lighting the bankhead, screens, etc.

SURVEYS.

As the subject of correct surveys of underground workings is becoming annually of increased importance in this Province, I insert the following article, taken from the London Mining Journal, which, setting forth the unsatisfactory state of underground surveying in England, applies with equal force to Nova Scotia:—

"Recent events in connection with mining operations show most forcibly the great importance of having the working plans of mines almost mathematically correct, yet we have had plain proofs that many, considered in every way most reliable, have been just the reverse. Many of the mining surveys now in use cannot be relied on within five or ten yards at a distance from the shafts, and the protracting of one line from the preceding ones, and so on in succession, perpetuates every error, and is a system that should not be adopted by the mining engineer. In many instances the taking of the magnetic variations has been entirely disregarded, and this has led to many errors appearing on plans. In taking the meridian, there is a great deal of difference in the observations taken on one day and that taken on another. The needle is affected unequally by the atmosphere, beside being subject to a diurnal variation, it is also deflected by electrical disturbances, such as the 'northern lights,' which are felt though unseen during the day.

The variation of the seasons, the heat of the sun, the presence of iron in the brass of the compass, all make the thoughtful surveyor discard the compass whenever he can, and fall back on the theodolite, an instrument capable of giving very accurate results and furnishing ready means of checking its work.

As to old mining plans, as a rule, it is no doubt correct to say that if they

were now brought into use, to have the workings correctly carried on such could not be done without going and comparing them or getting the true meridian again. But it has been stated by one of our mining engineers, who has paid a great deal of attention to the subject, that by adopting the solar meridian there would be a universal similarity in all plans, as every plan would be drawn on its proper meridian. Every plan throughout the country would be as parallel as possible, and by that means they would be able to compare them at once. However, the taking of the solar meridian as yet has not been adopted by many of our mining engineers, who consider it of more importance to know the variation of the compass from a certain line. Still it has its advocates, whose number will in all probability increase, foi it has its attractions, especially amongst the young members of the profession.

One of the simpler methods by which the meridian can be approximately determined, is by drawing a thin rod vertically on a drawing board or some level surface, the shadow cast by the rod being measured a short time before midday, and the vicinity marked. Through the point with the rod as a centre the arc of a circle is struck, when the extremity of the shadow again touches the arc after midday, the point where it touches is marked, and midway between the extremities of the two shadows may be found the point, which is in the same meridian as the rod itself It is most desirable for future reference to mark by strong stakes at several chains distance on either side of the shaft the meridianal line which has been taken as a base for the survey. In the surveying of boundary lines on the surface, or of the mainways in the skeleton of the survey undergound, the compass should be entirely discarded. Where very great care has not been taken it may be said the use of the magnetic needle undeground, where the greatest accuracy is so necessary, has led to many errors, which have led to litigation and loss of time by driving in the wrong direction. Surveying, however, can be done without a needle, especially where there is only one shaft, and this can be effected by two thin copper wires carrying heavy weights at the bottom immersed in buckets of water to diminish the oscillation, a deal straight edge being fixed so as almost to touch each wire at right angles to the line between them. The extremes of six or ten successive oscillations should be marked with a pencil on each straight edge, and the mean taken with a pair of compasses, and the wires fixed to such mean points. Standing behind the wires the surveyor should next send a candle along the heading as far as it could be seen, and fixed in a line with the wires, and this operation should be repeated in the opposite direction, placing a candle against one of the wires, and to check the whole it should be seen whether the three candles are exactly in line. The latter being the basis of the whole underground survey should be permanently marked by a few pegs driven into the roof with nails in them, or by some other marks. On the surface permanent pegs should be placed at some chains distance on each side of the shaft in a line with the wires. By this means there is obtained a line on the surface exactly corresponding with the base line of the operations underground.

This system has been found to be a really good one after the most severe tests that it was possible to have, not only in ordinary mining but in tunnelling as well. Surveys for the purpose of ascertaining the extent and direction of underground workings should be so trustworthy and accurate as to enable the surveyor to show from his map or plan the very points on the surface below which the mineral has been taken away, and to what extent the subterranean excavations have extended. This under ordinary circumstances he can do by taking the horizontal dimensions of the surface area, and then unite the horizontal dimensions of the areas from which the mineral has been excavated beneath. Another means frequently used in surveying,

was by having three stones in a line, and testing the compass frequently, when a correct survey could be ensured by a competent surveyor, and this could be done in thin seams of minerals where the theodolite could not be brought into use. Still, in making surveys of mines there can be no question as to the importance of the taking accurate note of the magnetic variations, so as to ensure the accuracy of mining plans, and these have at many places been entirely ignored, and with serious consequences to the owners of mines. In one case we are told of two beds of coal which were worked simultaneously according to the plans, and the result was that there was a difference of several chains, which greatly astonished the engineers. Only recently, too, in an action tried in one of the superior courts, heavy damages were awarded to a mineowner for trespass and getting minerals by the party who had gone beyond his boundary, owing to the inaccuracy of the plans. However, the importance of accurate plans in connection with every description of mining operations cannot be too forcibly expressed, nor can the best known systems be too often brought under the notice of mine managers and mining engineers, on whom so much responsibility rests for the safety of those employed under them, as well as for the security of the property placed in their keeping."

WIRE ROPES.

In a paper contributed to the Transactions of the Engineers' Club of Philadelphia, of which an abstract is given by the Engineering and Mining Journal, Dr. H. M. Chance gives the following valuable table, showing the tonnage raised by twenty-three wire ropes used at eleven different slopes in the anthracite coal regions on dips ranging from fifteen to sixty degrees; and the tonnage of six ropes at three shaft collieries. Nearly all of these ropes were made by the Roebling Company; are of seven strands of nineteen wires each, and were in use at some period from 1875–1880. The first cost of the ropes is caculated from Roebling's price list for October, 1880.

SLOPE.	No. of ropes.	Diam. Inch.	Length Feet.	Cost.	Tons.	Total tons.	Cost per ton	Cost per 100 feet lift.
1......	6	1¾	900	$3,240	66,616	375,700	0.86	0.095
2......	2	2	1,000	1,520	98,280	196,560	0.77	0.077
3......	1	1 8/4	850	510	203,700	203,700	0.25	0.029
4......	2	1¾	1,000	1,200	37,175	74,350	1.61	0.161
5......	1	1½	1,200	540	37,500	37,500	1.47	0.122
6......	1	1¾	1,100	660	77,700	77,700	0.85	0.077
7......	2	1⅜	950	760	41,825	83,650	0.90	0.094
8......	1	1½	950	428	70,950	70,950	0.60	0.063
9......	1	1½	675	304	102,200	102,200	0.29	0.043
10......	4	1¾	820	2,952	149,037	596,150	0.50	0.061
11......	2	2	1,050	1,596	166,650	333,300	0.48	0.046
Averages and totals,	23	......	933	$13,710	93,555	2,151,760	0,64	0.069
SHAFTS.								
1......	2	1¾	925	$1,100	88,715	177,450	0.63	0.068
2......	2	1¾	635	762	117,180	244,360	0.32	0.051
3......	2	1¼	500	350	86,222	172,445	0.20	0.041
Averages and totals,	6	......	687	$2,222	97,376	584,255	0.38	0.053

In these tables, says Dr. Chance, the cost has been estimated by the actual tonnage (exclusive of the weight of the mine cars) raised. The coal raised does not exceed two thirds of this amount, but the value of the discarded rope, estimated at one third its cost, has been considered an equal offset, and the figures given may, therefore, be taken as the average cost per ton of merchantable coal.

The following ingenious apparatus for loading and unloading pit-cages, known as Fisher's patent, may be found suitable for adoption in some of our collieries.

The apparatus may be briefly described as follows: The cage rails, instead of being fastened to the cage itself, are swung on axles working in bearings attached to the cage, and are fitted at one end with "L" pieces, and at the other end with deflecting levers, arranged to project below the bottom of the cage in such a manner that when the cage settles on the keps they incline the rails of the cage, so that when the cage has settled the tubs run by their own gravity on to the sheets, the tilting of the rails having previously deflected the front stops on the cage which keep the tubs in place. Simultaneously the platform in rear of the cage holding the empty tubs, standing in rails, and attached to four carrying levers, working in bearers under the rails, are automatically raised by a small cylinder (actuated by steam) to a similar inclination with, and in the same line as, the cage rails. This action drives the empty tubs down the incline into the cage, where they are arrested at the proper place by the front axle of the first loaded train striking a lever which releases the front stops on the cage. On the completion of the loading, the rails fall to their proper place in the cage as it rises, and the cessation of pressure on the engine lever allows the empty tub platform to resume its position. Corresponding arrangements can be used at the pit bottom.

This apparatus is said to have been in successful use at several collieries for some years, and to have effected a considerable saving in time and in the number of banksmen and bottomers.

At a late meeting of the Manchester Geological Society, Mr. Dickinson, H. M. Chief Inspector of Mines, showed an apparatus which had been adopted in several collieries, and records, by its attachment to the engine of the ventilating apparatus, the fluctuations in pressure of the air passing through the mine up to a water gauge of 6 inches, and the corresponding speed of the engine.

The following papers relating to the Geology and Mineralogy of Nova Scotia, have been published during the past year:

E. Gilpin. Occurrence of Lievrite in Nova Scotia. Inst. Nat. Science.
E. Gilpin. Trap Minerals of Nova Scotia. Ibid.
A. A. Hare. Geology of Bedford. Ibid.
Dr. Honeyman. Geology of Digby and Yarmouth Cos. Ibid.
Archœan Gnesis of the Cobequids. Ibid.

I purposed noticing several proposed improvements in gold milling appliances, but in view of the early date at which this report is required, I have deferred their consideration to a future time.

I have the honor to be, Sir,
Your obedient servant,

EDWIN GILPIN, Jr.,
Inspector of Mines.

LIST OF MINERAL LEASES (OTHER THAN GOLD.)

No.	Lessee.	District.	Area Sq. Miles.
	COPPER.		
	ANTIGONISH COUNTY.		
2	Ross, Sarah, and others		1
	COLCHESTER COUNTY.		
	Moir, Wm. C., et al	Tatamagouche	10½
	LEAD.		
	HALIFAX COUNTY.		
1	McClure, Charles F	Gay's River	1
	IRON.		
	PICTOU COUNTY.		
35	Carmichael, John R	East River	1
43	Hudson, James	"	1
	CAPE BRETON COUNTY.		
86	Brookman, S. J., et al	N. Side East Bay	1
91	Brookman, Phœbe	East Bay	1
92	Matheson, D., et al	"	1
93	Brookman, S. J., et al	"	1
84	Protheroe, Pryse	Cow Bay	1
	INVERNESS COUNTY.		
16	Inverness C. I. & R. Co	Whycocomah	1

Total Area under lease . . . . . 20½ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		ANTIGONISH CO.				
1	McKinnon, et al		3			
		CUMBERLAND CO.				
44	Baker, John W		1			
13, 14, 15	Black, C. H. M.		3			
21	Blight, James, et al		1			
47	Boston, C. M. Co		1		John Moffat	River Herbert
25	Campbell, Alex., et al		1			
32, 34	Campbell, Alex., et al		2			
35, 48, 49, 50	Campbell, Alex		4			
31, 33, 37, 38, 40, 41, 45, 46	Campbell, John		8			
12	Cumberland, C. M. Co		4	Working.	*R. Redpath*	Maccan
17	Domville, James		3		E. N. Sharp	St. John, N.B.
	Joggins, C. M. Association	Joggins	2	Working.	B. B. Barnhill	Joggins
	Joggins, C. M. Co	Cumberland	2			
20	Kirby, Lewis R.		1			
18, 19	Livesey, John		2			
5	Lawson, C. M. Association	Maccan	1			
42	Macfarlane, Alex		1			
51	Milner, Christopher		1			
53	Milner, Christopher		1			
1, 2, 3, 4	New York & Acadia Co	Scotia	4	Working.	William Bennett	Maccan

43	Pugwash & Spring Hill R. Co.		1			
16	Seaman, Gilbert		1			
24	Shannon, S. L.		2			
36, 39	Shannon, S. L., (in trust) et al		2			
6, 7, 8	Spring Hill Mining Co.	Spring Hill	3	Working.	*William Hall*	Spring Hill.
52	" "	"	4		" "	"
22, 23, 28, 29, 30	Styles Mining Co. (Limited)		5		J. S. Hickman	Amherst.
9	Victoria Coal Mining Co		2			
26, 27	Wright, John V		3			
			66			
		PICTOU CO.				
1	Acadia Coal Co	Fraser	1	Working.	H. S. Poole	Stellarton.
3	" " "	Acadia	1	"	*J. Maxwell*	Westville.
42	" " "	Pictou	4			
23	Allan, Sir Hugh, K't	Vale	3	Working.	J. B. Moore *John Greener*	New Glasgow. Vale Colliery.
10	Gray, B. G		1			
11	Haliburton, R. G., et al		1			
	Halifax Company, (Limited)	Albion	4	Working.	S. Cunard & Co. *John Rutherford*	Halifax. Stellarton.
13, 14	Intercolonial Company		2			
12	" "	Drummond	1	Working.	Robert Simpson	Westville.
6	Kirby, Lewis R		1			
15, 30, 31	Merigomish Company		3			
25	Nova Scotia Company	Black Diamond	4		H. L. Angel	Westville.
20	Price, D. E., et al		2			
24	Richey, M. H		1			
			29			

LIST OF COAL LEASES—(CONTINUED.)

No.	Lesse.	Colliery.	Area. Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		CAPE BRETON CO.				
3	Archibald, Blowers	Gowrie	1	Working.	Archibald & Co. *Chas. Archibald.*	North Sydney. Cow Bay.
2	Archibald, Thos, D.	"	1			
5, 28	Blockhouse Mining Co	Blockhouse	2	Working.	R. Belloni	Cow Bay.
29	" " (*sea area*)		1			
72	Brookman, Samuel		1			
76, 77	" S., et al		2			
15	Caledonia C. & R. Co	Caledonia	1	Working.	David MacKeen	Caledonia Mines.
31	" (*sea area*)		1			
30	Campbell, Alex		1		T. D. Archibald	North Sydney,
23, 25, 70	Cape Breton Co., (Limited)		3		D. J. Kennelley.	Louisburg.
14, 24	" " " "	Schooner Pond	2		*Joseph Simpson.*	Reserve Mines.
49	" " " "	Reserve	1	Working.	"	
64, 65, 68	" " " "	Lorway	3		"	
69	" " " "	Emery	1			
8, 9	Clyde Coal Mining Co	Ontario	$1\frac{1}{2}$	Working.	*John Sutherland.*	Port Caledonia.
87	Cossit, Geo. G		1			
	General Mining Association	Bridgeport	2		Rich. H. Brown.	Sydney Mines.
	" " "	Sydney	5	Working.	Cunard & Morrow.	Halifax.
	" " "	"	12			
27	" " (*sea area*)	"	5		*Richard Wilson.*	Sydney Mines.
	" " "	Lingan	10	Working.	*Donald Lynk.*	Lingan.
	" " "	"	4			

38, 39	" " "	Lingan	10			
10, 21	Gibson, John, et al		2			
4, 12, 16	Glace Bay Mining Co	Glace Bay	3	Working.	E. P. Archbold. *Henry Mitchell.*	Halifax. Little Glace Bay.
75	Henry, W. A		1			
22	Ingraham, R. J. and J. L.	Halfway	1			
6, 13, 18, 19	International C. & R. Co	International	4	Working.	R. Belloni *P. Johnstone*	Cow Bay. Bridgeport.
71	Jennings, Edward		1			
47	LeCras & McInnes		1			
66	Merchant's Bank of Canada	Gardener	2			
74	Moore & Moseley		$1\frac{1}{4}$			
81	Morton, Lemuel J		1			
80	McDonald, James		1			
52, 53	McLeod, Hugh		2			
88, 89, 90	Paint, Henry N. and others		3			
83, 85	Protheroe, Pryse		2			
73, 82	Reid, Thos. S., *(sea area)*		2			
40, 41, 42	Ross, H. E., et al		3			
79	Ross, W. J., et al., *(sea area)*		1			
43	South Head Coal Co	South Head	1			
32	Sword, Wm., *(sea area)*		3			
54 to 63	Sydney C. M. Co., *(sea areas)*		10			
46	Todd, A. Thornton	Collins	1			
67	Weatherbe & Kirby		1			
78	Weatherbe, R. L., *(sea area)*		5			
34, 35, 36	Victoria C. M. C., *(sea area)*	Victoria	5			
50, 51	" "		2			
			$130\frac{3}{4}$			

LIST OF COAL LEASES.—(Continued.)

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		INVERNESS CO.				
5	Aylmer, John Evans Freke..	Cape Mabou	2			
8	Evans, Thomas	Chimney Corner..	1			
9	Evans, Thomas, (*sea area*) ..	....	1			
7, 12	Inverness C. I. & R. Co.	....	2	Working.	Alex. Wright .. *D. McKay*	Moncton .... Broad Cove ......
13	Murray, George............	Port Hood	3			
4	Richey, M. H., et al	....	1			
11	Ross, W. J................	Broad Cove	1			
6	Ross, H. E. at al., (*sea area*)..	....	1			
14, 15	Smyth, Peter..............	....	2			
10	Tremaine, E. D., (*sea area*) ..	....	1			
17	McDonald, Hugh	....	1			
			16			
		RICHMOND CO.				
2	Marmaud, A. E............	Little River	1			
			1			
		VICTORIA CO.				
2	Campbell, Chas. J..........	New Campbellton	3	Working.	John McDonald..	New Campbellton..
3, 4, 5	Ross, William	Black Rock	5			
			8			

Total area under lease..255¼ square miles.

TABLE A.—COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Totals.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter	37,606	42,717	67,325	54,006	34,226	6,495	245	45	139,402	103,263
2nd Quarter	45,112	33,673	73,898	69,301	148,394	134,457	....	....	267,404	237,431
3rd Quarter	45,081	42,647	119,212	120,144	227,350	233,821	....	....	391,643	406,007
4th Quarter	55,620	52,112	111,762	103,517	158,439	142,079	....	....	325,821	288,313
Total	183,419	171,149	372,197	346,968	568,509	516,852	245	45	1,124,270	1,035,014
1880	143,085	134,671	461,811	434,922	422,884	380,848	4,930	4,218	1,032,710	954,659
1879	99,222	90,671	388,486	330,878	295,984	262,924	4,579	4,151	788,271	688,624
1878	113,873	104,869	315,395	288,403	340,056	299,055	1,279	1,184	770,603	693,511

TABLE B.—COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land sales........	27,120	15,143	93,029	56,755	2,502	6,074	45	......	122,696	77,972	200,668
Sea-borne	1,919	36	41,901	9,543	117,276	11,070	......	......	161,096	20,649	181,745
Nova Scotia—Total..	28,989	15,179	134,930	66,298	119,778	17,144	45	......	283,722	98,621	382,413
Quebec	34,442	1,106	81,882	1,555	145,159	4,484	......	......	261,483	7,145	268,628
New Brunswick.....	57,137	33,128	3,852	1,250	28,133	26	......	......	89,122	34,404	123,526
Newfoundland	......	......	1,231	......	60,472	471	......	......	61,703	471	62,174
P. E. Island	......	......	15,690	19,211	12,961	1,451	......	......	28,651	20,662	49,313
West Indies	......	......	1,325	......	20,295	......	......	......	21,620	......	21,600
United States.......	1,118	......	18,410	1,081	52,187	40,932	......	......	71,715	42,013	113,728
Other countries......	......	......	253	......	7,664	5,695	......	......	7,917	5,695	13,612
Total..........	127,756	49,413	257,573	89,395	446,649	70,203	45	......	826,003	209,011	1,035,014
1880	99,491	35,180	326,870	108,052	346,103	34,745	4,218	......	776,681	177,977	954,659
1879	71,700	18,881	255,674	75,204	243,290	19,664	4,151	......	574,905	113,719	688,624
1878	84,244	20,625	198,641	89,762	277,914	21,141	1,184	......	561,893	131,528	693,511

COAL.—SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1881.	Year 1880.
Nova Scotia.						
Land Sales....	51,914	42,377	47,659	59,718	200,668	184,837
Sea borne	7,751	35,890	66,030	72,074	181,745	168,076
N. Scotia—Total..	59,665	78,267	113,689	130,722	382,413	322,913
Quebec	12,650	85,237	129,911	40,830	268,628	239,091
New Brunswick..	16,889	29,594	35,205	41,838	123,526	97,817
Newfoundland ..	660	11,489	28,616	21,409	62,174	69,627
P. E. Island.....	....	9,114	19,406	20,793	49,313	46,767
United States....	3,153	23,135	57,264	30,176	113,728	123,423
West Indies.....	1,202	5,055	4,054	11,309	21,620	12,165
South America ..	....	....	......	561	561	......
Europe.........	....	4,584	8,467	......	13,051	12,857
Total	94,219	246,475	396,612	297,708	1035014	954,659
1880..	76,644	224,138	403,909	249,968	954,659	688,624
1879..	58,123	163,508	259,817	207,176	688,624	954,659

COAL.—GENERAL STATEMENT.

1881.	Produce.	Sales.	Colliery Consumption.
1st Quarter..............tons	139,402	103,263	27,450
2nd Quarter.............. "	267,404	237,431	24,292
3rd Quarter.............. "	391,643	406,007	23,871
4th Quarter.............. "	325,821	388,313	31,475
Total..........	1,124,270	1,035,114	107,888
1880	1,032,710	954,659	96,831
1879	788,271	688,624	84,787
1878	770,603	693,511	88,627

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31st, 1881.

Collieries.	Seams.	Produce.	Sales.				Colliery Consumption.		
			Paying Royalty.	Free.	Total.	Per Cent.	Engines.	Workmen.	Per Cent.
Cumberland County.									
Chignecto	North Seam	3,294	1,974	865	2,839	86	400	130	....
Joggins	Joggins Main	18,880	13,700	2,173	15,873	84	1,507	182	10
Minudie	....	400	200	200	400	100	....	....	....
Scotia	North Seam	260	240	50	290	....	....	....	....
Spring Hill	Black & South	160,485	105,622	46,125	151,747	94	4,705	4,092	5
Styles	Styles	150	....	....	....	....	....	....	....
Pictou County.									
Acadia	Acadia	87,582	59,545	21,801	81,346	92	5,422	1,696	8
Albion Mines	Third & McGregor	59,316	26,907	24,738	51,645	87	11,913	2,724	24
Intercolonial	Acadia	135,084	99,521	27,586	127,107	92	5,113	2,449	5
Vale	McBean	90,215	71,600	15,270	86,870	94	10,177	1,168	11
Cape Breton County.									
Block House	Blockhouse	61,108	56,754	95	56,849	93	2,800	1,404	7
Caledonia	Phelan	43,426	32,096	10,837	42,933	98	1,180	698	4
Glace Bay	Harbour	35,012	28,536	3,075	31,611	90	2,870	979	10
Gowrie	McAulay	64,180	50,368	11,001	61,369	95	1,130	1,241	5
International	Harbour	76,860	61,107	15,178	76,285	99	1,415	1,317	3
Lingan	Lingan	34,402	26,909	5,467	32,376	91	1,912	742	7
Ontario	Phelan	15,117	11,460	1,950	13,410	88	569	221	5
Reserve	Phelan	76,727	57,941	10,943	68,884	89	3,136	1,293	5
Sydney	Main	161,577	121,478	11,657	133,135	82	23,177	8,436	19
Inverness County.									
Broad Cove	....	45	45	....	45	....	....	....	....
Victoria County.									
New Campbellton	....	200	....	....	....	....	340	150	....
Richmond County.									
Little River	....	....	....	....	....	....	....	....	....
		1,124,270	826,003	209,011	1,035.014	90	78,166	28,922	9

Statement of the Numbers and Classes of Persons employed, and average results of each Colliery, during the year ended December 31st, 1881.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of Days per Person.		Average No. of tons per Skilled laborer underground.	Average tons per day per skilled labor underground.	Average quantity raised per day.	Horses.		Pits Worked
	Skilled Laborers.	Laborers.	Boys.	Days' Labor.	Mechanics.	Laborers.	Boys.	Days' Labor.	Persons.	Days' Labor.	Persons.	Days' Labor.	Under-ground.	Above ground.				Above.	Below.	Days.
CUMBERLAND CO.																				
Chignecto	11	3	2	4,069	4	3	2	2,089	31	8,639	56	11,737	250	268	299	1.4	16	3	3	208
Joggins	50	3	12	14,055	13	12	8	9,101	1	88	99	23,244	216	270	376	1.6	82	5	4	239
Scotia	....	....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	....	....	....
Spring Hill	166	67	50	74,080	30	64	13	27,477	2	550	392	102,107	261	256	966	3.7	620	3	16	257
Styles	....	....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	....	....	....
PICTOU CO.																				
Acadia	95	46	22	39,785	15	39	7	16,657	6	1,394	230	57,836	244	270	920	3.7	355	6	6	246
Albion	109	38	28	43,329	48	114	34	59,705	47	10,100	418	113,134	248	280	544	2.3	251	26	2	236
Intercolonial	133	65	57	66,299	33	50	8	26,550	6	1,113	352	93,962	260	285	1,015	3.5	489	8	10	288
Vale	169	20	13	51,092	30	33	6	24,015	....	....	271	75,107	252	300	533	2.4	400	8	10	225
CAPE BRETON CO.																				
Block House	73	7	46	20,444	22	24	5	13,373	....	....	177	33,817	162	262	1,050	6.3	466	14	23	165
Caledonia	50	10	10	15,250	17	24	8	10,859	3	680	122	26,789	217	221	686	3.7	237	5	8	183
Glace Bay	45	3	6	10,298	19	16	3	9,326	....	....	92	19,624	190	245	778	4.0	182	6	4	192
Gowrie	88	9	40	28,470	14	30	14	14,519	....	....	195	42,989	208	250	727	3.6	343	5	29	187
International	97	10	39	31,534	19	41	4	17,179	....	....	210	48,713	216	268	792	5.0	483	4	24	159
Lingan	51	2	14	16,123	3	22	10	8,596	....	....	102	24,719	240	245	674	2.4	124	4	6	283
Ontario	28	3	4	4,411	5	8	2	2,709	7	1,128	57	8,248	128	180	540	4.0	112	5	4	134
Reserve	122	12	35	38,684	13	14	4	13,424	....	....	200	52,288	229	300	628	2.8	347	5	16	221
Sydney	225	45	82	91,936	80	100	36	63,516	....	....	569	155,452	260	290	717	2.6	600	16	37	269
INVERNESS CO.																				
Broad Cove	1	...	...	36	...	...	...	....	....	....	1	36	......	......	......	......	......	....	....	....
VICTORIA CO.																				
New Campbellton	5	1	2	741	2	1	1	698	....	....	12	1,439	......	......	......	......	......	....	....	....
RICHMOND CO.																				
Little River	....	....	....	....	...	3	....	125	9	775	12	900	......	......	......	......	......	....	....	....
Total	1518	345	462	550,176	367	598	165	319,918	112	24,467	3567	894,961	236	277	740	3.4	......	123	204	217

COLLIERY CONSTRUCTION ACCOUNT—1881.

COLLIERIES.	Shafts.	Slopes.	Levels.	Machinery.	Colliery Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospecting.	Total.
CUMBERLAND COUNTY.											
Black Mine	....	....	....	....	....	....	....	....	....	544 36	544 36
Chignecto	....	6,900 00	....	14,750 00	6,850 00	3,065 00	4,813 00	9,050 00	....	....	45,428 00
Joggins	....	....	....	....	....	....	....	....	....	....	....
Scotia	....	....	....	....	....	....	....	....	....	....	....
Springhill	150 00	....	3,779 22	6,666 00	600 00	712 00	4,698 34	....	....	50 00	16,655 56
Styles	200 00	150 00	....	100 00	....	....	50 00	....	....	300 00	800 00
PICTOU COUNTY.											
Acadia	....	....	....	8,132 02	2,297 00	....	....	....	....	....	10,429 02
Albion	6,727 11	....	....	7,380 26	626 70	390 10	126 47	11,170 08	....	....	26,420 72
Intercolonial	307 54	....	1,758 92	3,106 50	348 61	....	848 25	50 00	1,907 78	....	8,327 60
Vale	....	....	....	60 00	....	....	....	....	....	....	60 00
CAPE BRETON COUNTY.											
Block House	....	....	....	....	....	....	....	....	....	....	....
Caledonia	....	....	541 00	....	....	....	....	....	....	....	541 00
Glace Bay	....	....	....	....	....	....	....	....	....	....	....
Gowrie	....	....	375 66	....	....	....	....	250 00	....	....	625 66
International	....	....	....	....	....	....	....	....	....	....	....
Lingan	....	....	1,077 60	....	....	....	....	....	....	....	1,077 60
Ontario	....	30 00	104 03	2,799 12	70 00	....	170 00	1,525 00	....	....	4,698 15
Reserve	....	3,227 80	4,211 51	....	....	....	50 00	....	....	....	7,489 31
Sydney	....	....	....	....	....	....	....	....	....	....	....
INVERNESS COUNTY.											
Broad Cove	....	....	22 50	....	....	....	....	....	....	....	22 50
VICTORIA COUNTY.											
New Campbellton	....	50 00	....	....	....	....	....	....	....	....	50 00
RICHMOND COUNTY.											
Little River	100 00	....	....	1,075 00	75 00	125 00	500 00	....	....	230 00	2,105 00
Total	7,484 65	10,357 80	11870 44	44,068 90	10,867 31	4,292 10	11,256 06	22,045 08	1,907 78	1,124 36	125,374 48

Nova Scotia Coal Sales from 1875 to 1881 (inclusive).

Year.	Sales.	Total.
1785	1,668	
1786	2,000	
1787		
1788	10,681	
1789		
1790		14,349
1791	2,670	
1792	2,143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	70,452
1811	8,516	
1812	9,570	
1813	9,744	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	91,527
1821	11,388	
1822	7,512	
1823		
1824	27,000	
1825		
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	140,820

Year.	Sales.	Total.
1831	37,170	Forw'd 368,196
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145,962	
1840	101,198	839,981
1841	148,298	
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	2,399,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576,935	
1865	635,586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	4,927,339
1871	596,418	
1872	785,914	
1873	881,106	
1874	749,127	
1875	706,795	
1876	634,207	
1877	697,065	
1878	693 511	
1879	688,626	
1880	954,659	7,377,428
1881	1,035,014	1,035,014
	Total....	18,482,156

SUMMARY.

1785 to 1790	14,349	1831 to 1840	837,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91,527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1880	7,377,428

COAL.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 ad.	1866	404,252	$1.25
1851	116,274	"	1867	338,492	"
1852	87,542	"	1868	228,132	"
1853	120,764	"	1869	257,485	"
1854	139,125	Free.	1870	168,180	"
1855	103,222	"	1871	165,431	"
1856	126,152	"	1872	154,092	.75
1857	123,335	"	1873	264,760	"
1858	186,743	"	1874	138,335	"
1859	122,720	"	1875	89,746	"
1860	149,289	"	1876	71,634	"
1861	204,457	"	1877	118,216	"
1862	192,612	"	1878	88,495	"
1863	282,775	"	1879	51,641	"
1864	347,594	"	1880	123,423	"
1865	465,194	"	1881	113,728	"

NOTE.—The quantities given for the years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably under estimated.

GOLD.—General Statement for the Year 1881.

Shewing the number of Mines at Work, days' labor performed, quantities of Quartz crushed, Yield of Gold, for the year ended December, 31st, 1881.

DISTRICTS.	Number of Mines.	Days' Labor.	Mills Employed.	Steam Power.	Water Power.	Quartz, &c. Crushed.	Yield per Ton.			Maximum Yield per Ton.			Total Yield of Gold.			Average yield per man per day for 12 months at $18.00 per oz.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou	3	15,426	3	2	1	1661	0	13	14	6	3	16	1,129	18	13	1.31
Gay's River	1	274	....	....	....	......	....	....	....	....	....	....	12	14	7	.78
Montagu	2	17,982	2	2	....	1165	0	15	10	3	1	15	900	6	16	.90
Oldham	1	2,471	2	1	1	604	0	10	21	1	7	9	329	10	4	.98
Renfrew	2	5,038	1	....	1	583	0	9	5	1	5	19	269	8	13	.96
Sherbrooke	10	29,285	6	4	2	5,279	0	9	18	5	3	0	2,580	2	20	1.58
Stormont	1	4,332	....	....	....	80	2	3	9	2	3	9	173	10	0	.73
Tangier	3	11,721	3	1	2	716	0	11	3	2	5	7	399	9	16	.61
Uniacke	3	10,003	4	3	1	3,094	0	8	23	2	0	0	1,355	8	21	2.28
Waverley	2	5,517	3	1	2	535	0	14	0	1	18	6	374	0	0	1.32
Wine Harbor	1	5,098	1	....	1	552	1	8	20	3	3	0	795	14	0	2.80
Unproclaimed	4	19,161	5	1	4	2,287	1	1	7	2	11	9	2,436	9	12	2.20
	33	126,308	30	15	15	16,556	0	12	20	6	3	16	10,756	13	2	1.52

MONTHLY STATEMENT FROM EACH GOLD DISTRICT

Month.	Caribou.							Gay's River.							Montagu.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.
January	5	870	34	39	19	2	23	1	99	...	...	12	14	7	3	2072	83	271	216	0	18
February	6	1174	47	52	52	18	5	1	90	...	...	...	...	...	3	2017	82	174	66	11	6
March	5	929	26	206	102	11	0	1	85	...	...	...	...	...	4	2182	84	50	26	11	0
April	3	2321	92	167	174	3	6	...	....	...	...	...	...	...	4	1677	67	164	184	7	19
May	3	2127	85	197	133	0	0	...	....	...	...	...	...	...	5	1992	79	149	144	7	2
June..........	3	1593	63	117	107	5	18	...	....	...	...	...	...	...	4	1055	42	120	100	12	11
July..........	4	1670	67	123	146	9	6	...	....	...	...	...	...	...	3	1359	54	.....	....	....	....
August	4	2136	85	165	103	1	21	...	....	...	...	...	...	...	4	1411	56	21	18	3	0
September.....	3	2293	90	305	120	19	0	...	....	...	...	...	...	...	5	1660	66	88	89	10	0
October	1	139	5	51	58	11	0	...	....	...	...	...	...	...	2	947	36	43	35	8	15
November	1	59	2	150	41	6	18	...	...	...	...	...	...	...	2	656	26	68	71	2	20
December	1	117	4	89	69	9	12	...	....	...	...	...	...	...	2	954	38	17	1	10	0
	3	15426	....	1661	1129	18	13	1	274	...	...	12	14	7	3	17982	....	1165	900	6	16

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month.	Oldham. No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	Renfrew. No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	Sherbrooke. No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.
January.....	1	168	11	75	47	9	0	4	640	25	21	28	0	5	10	2506	100	311	201	7	0
February.....	2	242	13	73	27	13	4	4	624	24	20	3	1	0	10	2328	93	374	283	6	0
March	...	......	....	14	5	7	0	2	367	15	61	9	1	12	11	2646	105	442	244	18	5
April	...	......	....	22	12	13	6	2	398	15	33	7	3	0	9	2340	94	304	146	2	0
May.	1	187	11	58	37	11	18	2	498	20	107	71	19	6	10	2392	95	329	186	5	0
June	1	141	9	57	39	13	12	2	558	22	100	40	2	0	11	2440	97	565	212	16	0
July..........	2	391	19	46	10	2	20	2	386	15	41	16	18	11	12	2340	93	676	263	5	0
August	2	423	16	35	7	13	0	2	332	13	15	3	12	0	10	2808	112	461	198	18	0
September....	2	297	11	49	43	15	11	2	363	14	30	12	0	3	11	2715	108	615	266	12	15
October......	2	320	13	41	14	13	8	1	350	14	....	....	....	....	11	2262	90	364	182	3	0
November....	1	201	12	62	52	17	9	1	259	10	120	55	11	0	10	2132	85	374	188	5	0
December	1	101	4	72	30	0	12	1	263	11	35	23	0	0	8	2376	94	462	206	5	0
	1	2471	....	604	329	10	4	2	5038	....	583	269	8	13	10	29285	....	5277	2580	2	20

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month.	Stormont. No. of Mines.	Stormont. Days' Labor.	Stormont. Men.	Stormont. Tons.	Stormont. Oz.	Stormont. Dwts.	Stormont. Grns.	Tangier. No. of Mines.	Tangier. Days' Labor.	Tangier. Men.	Tangier. Tons.	Tangier. Oz.	Tangier. Dwts.	Tangier. Grns.	Uniacke. No. of Mines.	Uniacke. Days' Labor.	Uniacke. Men.	Uniacke. Tons.	Uniacke. Oz.	Uniacke. Dwts.	Uniacke. Grns.
January	2	243	9	....	....	....	....	3	1523	60	26	22	6	9	4	1655	62	346	181	1	0
February	1	333	13	....	....	....	....	3	1392	55	283	82	1	23	5	1409	56	188	62	1	0
March	1	360	14	....	....	....	....	3	1638	65	214	146	9	5	6	1402	43	472	111	11	0
April..........	1	418	17	....	....	....	....	2	980	39	204	19	10	5	3	1724	68	249	141	11	11
May	1	362	14	80	173	10	0	2	950	38	60	83	5	0	5	1318	52	152	105	2	14
June	1	340	13	....	....	....	....	2	1631	65	....	....	....	....	4	734	29	134	76	6	14
July	1	221	8	....	....	....	....	1	512	22	...	....	....	....	1	47	2	286	154	8	12
August	1	260	10	....	....	....	....	1	516	20	...	....	....	....	1	50	2	222	81	15	3
September	1	707	28	....	....	....	....	1	389	15	29	10	16	17	1	100	4	273	94	16	6
October.......	1	221	8	....	....	....	....	1	326	13	36	2	16	17	2	446	18	172	104	5	18
November	1	260	10	....	..	....	....	2	585	23	64	32	3	18	2	499	20	232	115	8	19
December	1	707	28	....	....	....	....	2	1139	45	....	....	....	....	4	619	25	368	127	0	20
	1	4332	....	80	173	10	0	2	11721	....	716	399	9	16	3	10003	....	3094	1355	8	21

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month.	Waverley.							Wine Harbor.							Unproclaimed.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.
January	...	.....	....	28	26	5	0	1	356	16	27	43	0	0	6	1487	59	125	72	0	0
February......	...	.....	....	39	34	11	12	1	487	19	46	146	0	0	6	1483	59	100	52	17	0
March	...	.....	....	32	23	5	0	1	594	23	44	93	15	0	6	1694	67	192	200	3	7
April	2	674	27	45	31	16	0	1	530	21	25	75	0.	0	5	660	26	69	21	15	1
May	2	700	28	48	30	18	11	1	650	26	28	83	0	0	4	965	39	72	186	15	0
June	3	900	36	34	23	17	0	1	568	22	30	59	10	0	4	2023	80	2	0	2	15
July..........	2	675	27	26	19	1	0	1	450	18	50	26	0	0	4	2580	103	2	0	10	5
August........	3	822	33	34	32	14	0	1	.....	....	49	53	15	0	4	1286	51	310	319	6	5
September	3	992	39	....	....	....	....	1	.....	....	72	105	6	0	4	2025	80	360	424	12	11
October	2	439	17	30	20	12	0	1	480	19	53	33	12	0	2	1665	66	325	355	8	0
November	2	363	15	97	74	0	1	1	469	19	59	29	17	0	2	1680	67	380	433	15	16
December	2	352	14	122	57	0	0	1	514	20	69	46	19	0	2	1613	64	350	366	4	0
	2	5517	....	535	374	0	0	1	5098	....	552	795	14	0	4	19161	....	2287	2436	9	12

GOLD.

GENERAL ANNUAL SUMMARY.

Year.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2,000 lbs.			Total Days' Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A day.	A year.
1862	7,275			6.473	1	2	11	156.000	$ 83	$249
1863	14.001	14	17	17,902		16	11	273,624	92	276
1864	20.022	18	13	21,434		18	16	252,720	1 42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2 15	645
1866	25,204	13	2	32.161		15	2	211,796	2 14	642
1867	27,314	11	11	31,386		17	9	218.894	2 24	672
1868	20.541	6	10	32.262		12	17	241,462	1 53	459
1869	17.858	0	19	35,147		10	4	210.938	1 52	456
1870	19,866	5	5	30,829		12	21	173,680	2 05	615
1871	19.227	7	4	30.791		12	11	162,994	2 12	636
1872	13.094	17	6	17,093		15	7	112.476	2 09	627
1873	11.852	7	19	17,708		13	9	93,470	2 28	684
1874	9.140	13	9	13,844		13	5	77,246	2 12	636
1875	11.208	14	19	14,810		15	4	91,698	2 20	660
1876	12.038	13	18	15.490		15	13	111,304	1 94	582
1877	16.882	6	1	17.369		19	10	123,565	2 46	738
1878	12,577	1	22	17.990		13	23	110,422	2 05	615
1879	13,801	8	10	15,936		17	8	92,002	2 34	702
1880	13.234	0	4	14,037		18	20	103,826	2 18	54
1881	10,756	13	2	16,556		12	20	126,308	1 52	456
Total.	321,362	18	7	412,741	....			3,157,191	....	......

MINERALS OTHER THAN THOSE LEASED FROM THE CROWN.

Gypsum Exports—Ton of 2,000 lbs.

Windsor	Tons.	70,853	Value	$70,786
Hantsport	"	5,665	"	5,405
Cheverie	"	26,785	"	18,190
Walton	"	3,830	"	2,752
Total	"	107,133	"	$97,133

Building Stone.

Antigonish	Tons.	17	Value	$ 68
Pictou	"	636	"	3,569
Wallace	"	2,662	"	13,500
" (Dominion)	"	400	"	500
Amherst	"	2,723	"	12,244
Total	"	6,638	"	$29,881

Grindstones, Etc.

Pictou	Tons.	398	Value	$4,100

Messrs. A. Seaman & Co., Lower Cove, Cumberland Co.

1,680 tons Grindstones	Value	$20,160
4,000 boxes Whetstones	"	4,000
		$24,160

Fireclay.

McIntosh & Dewar, Stellarton, Pictou Co	400 tons.
Pictou	1½ tons (exported.)
	401½ tons.

IRON MINING.

AMOUNT MINED.

Londonderry	39,588.10 tons.
Guysborough	255 "
Total	39,843.10

AVERAGE FORCE EMPLOYED DAILY.

Belowground,	Miners	49
"	Laborers	58
"	Boys	4
Aboveground,	Mechanics	5
"	Laborers	20
"	Boys	3
Total		139

MANGANESE.

AMOUNT MINED.

Tenny Cape	125 tons.
Walton	7 "
Cheverie	17 "
Pembroke	6 "
North River	6 "
Loch Lomond	70 "
Total	231 "

AVERAGE FORCE EMPLOYED DAILY.

Men	40
Boys	6
Total	46

The returns of coal transported by the Intercolonial Railway were not received in time to be included in this report.

FINANCIAL STATEMENT.—GOLD.

Mines Department for Twelve Months ended December 31st, 1881.

DISTRICT.	RECEIPTS.				EXPENDITURE.				
	Rents.	Royalty.	Sites.	Totals.	Return Rents.	Return Royalty.	Royalty Commissi'n.	Salaries and Surveys.	Totals.
Caribou	668 00	337 08	....	$995 08	20 00	....	13 12	92 50	$125 62
Fifteen Mile Stream	934 00	69 05	....	1003 05	56 00	69 05	....	10 00	135 05
Gay's River	63 00	5 34	....	68 34	32 00	....	....	6 00	38 00
Lawrencetown	158 00	69	....	158 69	....	....	....	....	....
Montagu	536 00	353 12	....	889 12	132 00	....	22 75	365 38	520 13
Oldham	282 00	108 89	....	390 89	....	....	2 67	22 00	24 67
Ovens	8 00	....	....	8 00	....	....	....	....	....
Renfrew	26 00	71 28	....	97 28	....	....	4 40	22 00	26 40
Sherbrooke	56 00	975 95	....	1031 95	....	....	51 80	613 32	665 12
Stormont	304 00	....	20 00	394 00	16 00	....	....	....	16 00
Tangier	555 00	182 34	....	737 34	2 00	....	8 19	....	10 19
Uniacke	264 00	463 65	....	727 65	....	....	10 77	138 82	149 59
Wagamatkook	6 00	....	....	6 00	....	....	....	....	....
Waverley	1738 00	133 16	....	1871 16	540 00	....	2 38	27 50	569 88
Wine Harbor	64 00	416 43	....	480 43	....	....	7 59	....	7 59
Unproclaimed	5032 00	27 89	....	5059 89	116 00	....	....	463 09	579 09
Prospecting Licenses	....	....	....	8822 48	....	....	....	....	*341 50
	$10684 00	3144 87	20 00	22671 35	914 00	69 05	123 67	1760 61	3208 83

*Return.

OTHER THAN GOLD

Mines Department for Twelve Months ended December 31st, 1881.

COUNTIES.	RECEIPTS.				EXPENDITURE.			
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Return Licenses to Work.	Surveys.	Totals.
Annapolis	$60 00	$50 00	....	$110 00	....	....	$20 00	$20 00
Antigonish	300 00	....	....	300 00	$40 00	....	7 50	47 50
Cape Breton	720 00	475 00	$42726 89	43921 89	20 00	$50 00	....	70 00
Colchester	520 00	....	....	520 00	100 00	....	....	100 00
Cumberland	560 00	150 00	118 74	828 74	20 00	50 00	6 00	76 00
Guysborough	260 00	....	....	260 00	200 00	....	....	200 00
Halifax	40 00	....	....	40 00	120 00	....	....	120 00
Hants	80 00	....	....	80 00	....	....	....	....
Inverness	260 00	....	....	260 00	40 00	....	....	40 00
Pictou	1020 00	75 00	30828 99	31923 99	20 00	....	....	20 00
Richmond	280 00	50 00	....	330 00	20 00	....	....	20 00
Victoria	460 00	....	....	460 00	120 00	....	....	120 00
	4560 00	800 00	73674 62	79034 62	700 00	100 00	33 50	833 50

ABSTRACT ACCOUNT.

Receipts and Expenditures for the Twelve Months ended December 31st, 1881.

RECEIPTS.			EXPENDITURE.		
Licenses to Search	$4,560 00		Return Licenses to Search	$700 00	
" " Work	800 00		" " Work	100 00	
Royalty	73,674 62		Surveys	33 50	
		$79,034 62			$833 50
Rents	$10,684 00		Return Rents	$914 00	
Royalty	3,144 87		" Royalty	69 05	
Mill Sites	200 00		Royalty Commission	123 67	
Prospecting Licenses	8,822 48		Salaries and Surveys	1760 61	
		$22,671 35	Return Prospecting Licenses	341 50	
					$3208 83
			General Expenses	$5587 29	
			Postage	85 20	
			Stationery and Printing	234 81	
					$5907 30
		$101,705 97			$9949 63

REPORT

OF THE

DEPARTMENT OF MINES

NOVA SCOTIA,

FOR THE YEAR 1882.

HALIFAX, N. S.:
COMMISSIONER OF PUBLIC WORKS AND MINES,
QUEEN'S PRINTER.
1883.

CONTENTS.

DEPARTMENT OF MINES.

REPORT.

FOR THE YEAR 1882.

To His Honor the Honorable ADAMS GEORGE ARCHIBALD, *C. M. G.*,
Lieut-Governor of the Province of Nova Scotia, &c., &c., &c.

MAY IT PLEASE YOUR HONOR :—

I respectfully present herewith to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled by him from official and other returns made to the Department of Mines, during the year 1882.

ALBERT GAYTON,
Commissioner of Public Works and Mines..

HALIFAX, February 8, 1883.

REPORT

ON THE

MINES OF NOVA SCOTIA,

BY EDWIN GILPIN, JR., A.M.,F.G.S.,M.R.S.C.

INSPECTOR OF MINES,

(Member of the North of England Institute of Mining Engineers.)

OFFICE OF INSPECTOR OF MINES, Feb. 5th, 1883.

THE HON. ALBERT GAYTON, M.P.P.,M.E.C.,

Commissioner of Public Works and Mines:

SIR,—I beg leave to submit the following Report on the Mines of the Province, carried on during the past year.

In addition to a detailed notice of the operations at each Mine, and the usual statistical tables, I submit a summary of the amount of minerals exported, not paying Royalty to your honorable Government.

The following summary shows so far as I have been able to learn, the extent of the mineral production of Nova Scotia during the year 1882, compared with that of the previous year.

		1881.	1882.
Gold	Ounces	10,756	14,107
Iron Ore	Tons	39,843	42,135
Manganese Ore	"	231	205
*Coal raised	"	1,124,270	1,365,811
†Gypsum	"	107,133	133,426
†Building stone	"	6,638	4,357
†Barytes	"	40	
Coke Made	"	27,871	26,731
Fireclay	"	401	
Grindstones, etc.	"	1,680	2,450

Through the kindness of the Collectors of Customs at the ports specified, I am enabled to give further details under this head at the end of the Report.

---

* Ton of 2,240 lbs.

† Quantities shipped. Amounts used in Nova Scotia unknown.

COAL TRADE.

The total sales for the year 1882 amounted to 1,250,179 tons, against 1,035,014 tons in 1881, being an increase of 215,165 tons.

The following are the most noticeable points in the coal trade:

The home sales were 458,952 tons, against 268,628 tons in 1881. The coal sent to the Province of Quebec amounted to 383,031 tons, an increase of 114,403 tons over the quantity sent in the year 1881.

The sales to New Brunswick show an increase of 30,091 tons.

The sales to Newfoundland increased from 62,174 tons in 1881 to 79,732 tons, an increase for the past year of 17,558 tons.

The sales to Prince Edward's Island show a slight increase.

The sales to the United States fell off 14,426 tons.

The sales to other points present little to be noticed.

CUMBERLAND COUNTY.

The total sales of this County amounted to 218,349 tons, against 171,149 tons in 1881. The sales to Quebec were 58,561 tons, against 35,548 tons in the year 1881. The sales to New Brunswick showed an increase of 23,170 tons.

COLLIERIES.

Chignecto.—During the past year this mine was put in complete working order. The levels have been extended east and west, and counter balances driven, and the regular extraction of coal commenced. A furnace 8 feet 6 inches wide, with an arch of the same radius, was built at the bottom of the old shaft. The total height of the heated column, including a stack of 50 feet, is 150 feet. Twenty workmen's houses have been erected, and the bankhead screens, etc., have been roofed over. The bankhead is lighted by three electric lights, which have been found to work very satisfactorily, and to greatly facilitate screening, etc., at night. The branch railway has been straightened and laid with heavier rails, and a locomotive substituted for the horses formerly used in taking the coal to the Intercolonial Railway. The output was 12,504 tons.

Joggins.—At this mine the operations have been on an enlarged scale during the past year. The workings have been continued in the old slope on the system in force during the past few years. At the face of the old workings a new slope has been sunk and equipped. It is about a mile and three quarters from the shore, and it is propos-

ed to connect it with the wharf by means of an endless rope. The completion of the new winning will enable the output of this colliery to be very materially increased during the year 1883. The output was 20,178 tons against 18,880 tons in 1882.

MINUDIE.—During the year preparations have been made by the Minudie Coal Mining Co. for effective operations, by sinking a slope 500 feet long on their four and a half feet seam. The necessary engines, houses, tenements, etc., have been put up, and a road is being prepared to a wharf on the river.

SCOTIA.—A few tons were extracted for land sale, and a new slope started to the west of the old one. Some prospecting was done on the property with a view of finding other seams.

SPRINGHILL.—The operations at this colliery have been continued with customary vigor. The extraction of pillars in the east section of the north seam has been finished. The other workings have been regularly carried on. The tunnel to the overlying new seam has been completed, and is now connected with the winnings in this seam made through the slope sunk during the summer. Another borehole has been put down to furnish a more constant supply of water for the boilers. It is proposed to erect a mechanical ventilator during the approaching summer. The output was 200,353 tons, against 160,485 tons in 1881.

PICTOU COUNTY.

The total sales of this County during the year 1882 were 446,137 tons. The home sales show an increase of 42,817 tons. The sales to Quebec were increased to a similar extent. The sales to other points remain unchanged. The usual amounts of coke were made.

ACADIA.—During the past year the extraction of pillars in the working lift has been continued, and the slope has been extended for a new lift. The coal continues to maintain its uniform quality. The new Guibal fan, referred to in my last report, has been found to work very satisfactorily. The pillar work is carried on with safety lamps, and during the summer a miner was fined for injuring his lamp.

The economical method of burning the culm for steam purposes, practiced at this mine, is still continued satisfactorily, and merits the attention of manufacturers through the Province. The output of the past year was 105,569 tons, against 87,582 tons in 1881.

ALBION MINES.—The operations in the third seam have been continued during the past year, and the colliery is now in full operation.

The Dip winnings from the McGregor shaft have been continued, and the east levels turned away to allow of a back balance. The heapstead in the McGregor pit has been roofed, and it is proposed also to roof in the boilers, heater, etc., at this pit.

The manufacture of Coke has been steadily continued during the year, and the returns show a yield of 12,512 tons. A new range of 50 ovens is being erected a few yards from the McGregor pit, and are arranged for a ready and economical system of supplying the slack and loading the coke. The output of the mine was 141,090 tons, against 59,316 tons in 1881.

INTERCOLONIAL.—The operations of the preceding year have been steadily continued. The extraction of pillars in the western face of the working lift has been commenced. The levels and bords going east have been considerably advanced. The slopes are being sunk for a new lift. In the No. 4 slope the bords in the upper workings have been advanced and the slope deepened.

The new shaft to the second seam struck the coal at 218 feet. An air shaft has been started to the rise, and drivages are being made to connect them. The seam will give about 8 feet of coal, similar in quality to that now being mined by the Company in the Acadia seam. This new winning will enable the Company to greatly increase their output during the coming season. The output of the colliery was 150,486 tons, against 135,084 tons in 1881.

VALE.—During the past year the workings in the lower lift have been extended, and the pillar working has been continued satisfactorily. The new lift has been won out, and the bords started. The coal appears to maintain its quality in the new lift. A large Knowles pump has been put down with a 6 inch pipe to raise the water from the lower level, a distance of 1,800 feet, or a vertical lift of 875 feet.

A new boiler has been added to those supplying steam to the winding engine and pumps. The Guibal fan has been started and is found to work very satisfactorily. The new winding engines are being erected, and upon their completion the colliery will be very well equipped. The output was 92,808 tons against 90,215 tons in 1881.

CAPE BRETON COUNTY.

The sales of coal from this County amounted to 585,568 tons against 516,852 tons in 1881.

The Home sales were 169,327 tons against 136,922 tons during the preceding year, an increase of 32,405 tons. The sales to Quebec show an increase of 49,249 tons over those of the preceding year. The sales to the United States show a decrease of 19,628 tons. The sales to other points show slight increases.

COLLIERIES.

SYDNEY.—During the past year the workings have been continued in a systematic manner. The changes in the shaft arrangements referred to in my last report have been carried out and have resulted in improving the ventilation. The force pump at the Queen shaft has

been completed and is now at work. An ingenious arrangement of the empty road at the south side of the pit bottom has done away with the bottom horse. The experiment of using salt for keeping down the dust in the levels and engine planes was tried by Mr. Brown with satisfactory results. At a comparatively small cost the roads have been made much healthier for men and horses, and the cost of axle grease is materially lessened. The underground engines have been fitted with double brakes. Five blocks of miners' houses have been built. The output was 156,758 tons against 161,577 tons in 1881.

LOW POINT.—During the past summer the General Mining Association, having acquired the property formerly known as the Victoria, have repaired the railway, rebuilt the pier, and prepared for opening a large mine at Low Point. The seams at the point selected for the opening lie at a lighter angle than at the Victoria mine, and are said to be of excellent quality.

LINGAN.—The returns for the first quarter of 1881 show a production of 2,399 tons. Since that date operations have been suspended.

RESERVE.—At this mine work has been pushed in both slopes. Ten bords were worked out of the French slope, and the west slope. bords were continued. Some necessary repairs were made to houses, etc. It is proposed to sink a shaft to the dip to win the Reserve and Emery seams. The output of the mine was 93,828 tons, against 76,727 tons in 1881.

INTERNATIONAL.—The work of the year has been an extension of the operations recorded last year. A new dip road is being driven near the face of the east dip bords to shorten the railway haulage in the dips. On the surface the bankhead has been raised, and will be roofed in. A house has been built for the surface foreman, and other repairs carried out. The output was 109,286 tons, against 76,860 tons in the preceding year.

LITTLE GLACE BAY.—At this Colliery the work has been carried on more briskly than has been the case for some years. The levels and bords on both sides of the pit have been continued. The output was 70,186 tons, against 35,012 tons in 1881.

CALEDONIA.—During the past year the bords to the rise of the water level were worked. The west level was driven to the barrier, and the bord workings continued from it. The extraction of pillars was continued on both sides of the pit. The heapstead was raised four feet. The output was 59,893 tons, against 43,426 tons during the preceding year

ONTARIO.—At this Mine the slope has been extended 300 feet, and levels have been turned away to the east and west. A small furnace has been erected. A new winding engine has been built and repairs made to the houses. The output has been 24,541 tons, against 15,117 tons in 1881.

BLOCK HOUSE.—The extraction of pillars is continued at this Colliery. I am informed that arrangements are being made to sink to the underlying eight feet seam. The output was 61,753 tons, against 61,108 tons in 1881.

GOWRIE.—Operations have been continued on the upper level, and some pillars have been drawn on the lower level. The new shaft has been put in operation and the fittings, machinery, etc., appear to be of excellent design and workmanship. The output was 62,256 tons, against 64,180 tons in the preceding year.

MISCELLANEOUS.

Operations at Little River, Richmond Co., were stopped in the spring. No regular work was carried on at Broad Cove and Campbellton.

Discoveries of coal were reported from Leicester, Cumberland Co.

Hantsport, Hants Co., and East Bay, Cape Breton Co. Near West River Station, on the Pictou Railway, a seam of coal was said to show eighteen inches of good coal, associated with thirty inches of mixed coal and shale.

In Onslow, Colchester Co., prospecting was carried during the summer, and resulted in the discovery of several seams, one of which was said to be 12 feet thick.

GOLD MINING.

The anticipations of an increased yield of gold during the past year, as referred to in my last report, have been well realized. The total yield of gold during the year was 14,107 oz, 3 dwts. 20 grns., against 10,756 oz. 13 dwts. 2 grns. during the preceding year. This is the largest yield since the year 1871, except during 1877 when the production rose to 16,882 ounces.

The returns from the various districts show the customary annual fluctuations. Sherbrook makes a return of 6,251 tons of quartz crushed with an average yield per ton of 8 dwts. 3 grns. This low average is due to the trials being made on a large scale, of working wide beds of low grade ores. Similar work has been tried at Uniacke, so far I understand with encouraging results. Should these experiments, which demand strict economy in mining and skilful milling, succeed, the future of gold mining in this Province will be settled on a new basis, more permanent if not as alluring as the rich lodes which occasionally reward the prospector's toil.

The work of opening up new districts has been successfully carried on at Chezzetcook, and Salmon River, and during the approaching season these localities will receive still more attention.

DISTRICTS.

CARRIBOU.—During the past year but little work was done at the old Jennings Diggings.

At Moose River operations were confined principally to the property of the Moose River Gold Mining Company. Under the superintendence of Mr. C. A. Scott the Foster mill was united with the new mill, giving twenty stamps driven by steam, and furnished with breaker, feeding bins, and Frue Vanner for treating the tailings. Two shafts have been sunk on the North Sutherland lode to a depth of 150 and 200 feet and regular stoping carried on. Shafts have also been sunk on the Comstock and other lodes. It is proposed to crosscut the measures to the south of the Sutherland lode by means of a tunnel at a depth of 100 feet. A Clayton air compressor feeds four Ingersoll drills, which have been found to work very satisfactorily, and are stated to effect a considerable saving as compared with hand drills in the slopes. The arrangements for pumping and hoisting are systematically and well arranged.

Mr. Touquoy did some work on the western extension of the Sutherland lode, and in Carribou.

Fifteen Mile Stream.—This district has received much attention this year, and promises well. The Hall-Anderson Gold Mining Company have erected a mill, houses, etc., and have worked the Serpent and Orion lodes, James Hudson, Esq., has traced several of the southern lodes from the Hall-Anderson area into his, and finds that they promise favourably; during the approaching season he proposes tracing the Serpent lode.

This vein has been traced to the west across the property of Mr. J. S. Mackay, of New Glasgow. Mr. Grant and the Boston and Halifax Company have worked on their areas.

Montagu.—The Rose Gold Mining Company have ceased working. Work was carried on during most of the year on the Symonds and Kaye property. Prospecting was done by Mr. Stuart on the Lawson and other properties. Beyond this but little work was carried on. The Concentrator, erected by Mr. Hale, was burnt in the fall.

Waverly.—Work was done by Mr. McClure on his areas, and at one or two other points. At the close of the year Mr. Huff found on area 250 a seven inch lead, believed to be the source of some rich boulders long known at this point. The district, however, still continues in a depressed state. The treatment of the tailings has been carried on during the past year, and it is to be hoped that the subject will more generally engage the attention of our miners.

Oldham.—Comparatively little work has been performed here during the year. Mr. Baker opened and worked a large cross country vein, running on a general north and south course, and dipping to the west. The Messrs. Donaldson worked for some time on their areas to the south of the Baker Mine. A little tribute work was performed at one or two points. Mr. Barnstead is stated to have found the continuation of the Britannia lode.

Renfrew.—Beyond the operations of Dr. Rae, little work has been done here. Operations have been carried on by him in the Hard, Brook, and Bain lodes. During the summer repairs were made on the Ophir Mill.

Sherbrook.—The returns from this district are 2,542 oz. 17 dwts. 14 grns., against 2,580 oz. in the year 1881.

On the Wellington a little work was done to test some new lodes. Tribute work was performed on the Hadyn and Woodville areas. In the fall a promising lode was found on the Dominion area.

In the Palmerston property the belt was exclusively worked. A tramway has been constructed to the mill, and the problem of successfully working Nova Scotia low grade ores appears to be settled in this district. A consolidation of the Palmerston and several adjoining properties has been effected, under the name of the Pactolus Gold Mining Company, and preparations are being made for more extended operations.

The Cumminger property at Cochran's Hill was transferred to the Boston and Halifax Gold Mining Company, who have continued and extended the former workings.

Stormont.—The Gallaghar Gold Mining Company are now in regular working order. A shaft has been sunk cutting the Mulgrave lode at 360 feet. At 260 feet a cross cut has been made to the Gallagher lode. Levels have been driven and stoping carried on systematically. Trial shafts on a lode, lying south of the Mulgrave lode, 6 to 10 inches thick, with 5 feet of slate having suckers of quartz, have given very satisfactory results.

The new mill is driven by a 12 inch cylinder, and has 10 stamps of 750 lbs. each and is of an excellent design. Two Burleigh drills are used at this mine, and were found to give satisfactory results in sinking and driving.

Tangier.—At Strawberry Hill Mr. Townshend continued his operations. The mill has been extensively refitted, and work has been done on the Forrest and other lodes, near the Mooseland Road.

The Satemo Company have continued their operations in the Nugget and Kent lode. The operations of the Pittsburg Gold Mining Company were stopped during the summer, and it is proposed to continue the workings of the property in future on the tribute system.

The Kent Company have worked the Kent and Nigger lodes and crush at the Pittsburg Mill. It has been proposed to change the system of carrying the water through a long flume, at present adopted for driving the mill, by building a dam across the River. The returns from this district are increasing again, and it is to be hoped that they will lead to its resuming its former position as a good paying district.

Uniacke.—Mr. Prince worked the Nugget lode to the east of the ground where it was operated by Mr. Blois, and toward the close of the year resumed operations on the slate belt west of the mill. On the Montreal property the large slate belt was reopened and extensively worked. Mr. Davidson sunk on a 12 inch lode to a depth of 200 feet and carried stopes east and west. The Galena lode was worked by Mr. Lee. At several other points a little tribute work was done.

Wine Harbor.—Operations at the Henry Mines were suspended in the spring, since which date there has been no work of any importance done here.

Other Districts.—At Lochaber between Sheet Harbor and Fifteen mile stream the Lochaber Gold Mining Company have found a belt of slate and quartz seven feet wide showing very well. Numerous good specimens have been found, and about 40 tons of promising quartz has been mined for a trial crushing.

At Ecum Secum, and Beaver Dam a little prospecting has been done. At Killag Mr. Stuart trenched East of the River and exposed sixteen lodes some of them showing gold. The MacKinlay Company found some promising lodes.

At Salmon River Messrs. Ross and Hattie have continued to develop their four inch lode, and have erected the mill formerly in operation at Dun Cove.

The Archibald property, after a suspension of several months owing to litigation, is again being worked vigorously. The lode maintains its richness and size, and keeps a thirty stamp mill running steadily.

At Chezetcook, the Oxford Gold Mining Company have started a very complete milling plant, and have erected the necessary stores and dwelling houses. Work has been pushed vigorously, and the district has been well established as a gold producer by their systematic development. Mr. Stather, Mr. McKay, and the Messrs. Vaughan have all made important discoveries to the north and west of the Oxford property. Additional prospecting was done by Dr. Cogswell, and by Messrs. Weston, McLeod, and others.

COPPER.

Discoveries of copper ore were reported from Malagash, Digby, and Dalhousie, and some prospecting was done at Seal Island, Bras d'Or, and St. Ann's, Cape Breton. At Coxheath, near Sydney, the Coxheath Copper Mining Company have sunk two shafts 1100 ft. apart. These shafts have been sunk about 200 feet, and levels and cross cuts driven. Some bodies of very rich ore were cut; nearly all the ore bed, which is about 25 feet wide, shows ore. The owners have erected an agent's and other houses, and expect to begin the shipment of ore in the spring, as soon as their machinery is set up.

SILVER, LEAD, &c.

During the past year, discoveries of silver-bearing ore have been reported from Cheticamp and St. Ann's in Cape Breton, and from Canaan and Hopewell in Nova Scotia. A little further prospecting has been done at Arichat, and Pleasant Bay in Cape Breton.

At Smithfield, in Colchester County, work has been done by Mr. H. Clarke to prove a large body of sulphides of galena and iron, in limestone, presumably of Carboniferous age. Assays are stated to show varied percentages of silver up to 100 ounces to the ton of lead, and gold up to 5 dwts. to the ton of ore. The property has attracted a good deal of attention, and it is hoped that efficient steps will be taken to develop it fully. Similar ores were found in the same district by Mr. Pitblado.

IRON MINING.

The mines of the Steel Company of Canada were kept in full operation during the summer. The No. 7 level has opened up a valuable range of ore in the west mine. In the Cumberland and in the Cooks Brook mine a small extraction of ore was made. Some ore was also taken from the north vein.

A compact red hematite of good quality was found near the village of Maitland, and at several points further west.

Specular iron ore is reported to have been found at Roman Valley, Guysborough. The Crane Iron Company, of Philadelphia, have taken out 3,000 tons of ore from their mine at Salmon River Lakes, Guysboro. At present the best means of transporting the ore to a good shipping place in Chebucto Bay is under consideration and mining has been stopped. The ore is said to be of good quality and the deposit appears to be of unusual size. The work so far as carried has proved the lead to be from 25 to 35 feet wide, and that these dimensions hold good to a considerable depth.

MANGANESE, Etc.

Mr. Mosely has continued shipping ore from his Loch Lomond mine, which establishes a new mining industry in Cape Breton. He intends erecting an engine for pumping and other purposes. The amount mined was 59 tons.

Messrs. R. J. & J. W. Stephens worked during the summer at Cheverie, and took out 21 tons of ore.

Mr. R. J. Stephens also tested some property at Walton, and took out 6 tons of ore.

Mr. J. W. Stephens continued mining at Tenny Cape, and shipped 120 tons of first-class ore. Prospecting was continued at the Manganese deposits, near the Valley Station of the Pictou Road.

Small quantities of antimony ore were reported as being found at Meagher's Grant, Musquodoboit. The oil borings in Cape Breton, referred to in previous reports, have been suspended. Arrangements are being made to put down some bore holes, near Pictou, for the purpose of testing a tract of country which yields good surface indications of oil.

A deposit of mica has been tested during the past summer at McNiel's Harbor, near Cape North. The owners report that the mine promises to yield a large supply of mica of good size and color.

The shipments of gypsum from Windsor and the vicinity are the largest recorded for some years, and it is gratifying to see an extension of this trade, as it is one capable of being very largely increased.

The usual amounts of limestone have been quarried for the Londonderry furnaces, and the yearly use of this article for lime making has been maintained, Mr. McLaughlin's out-put being about 7000 barrels.

ACCIDENTS.

During the year 1882 the following fatal accidents occurred:

1. March 11.—J. McKinnon, miner, Coxheath Copper Mine, killed by fall of stone in sinking shaft.

2. May 12.—Angus McIsaac—miner—Londonderry Iron Mines, —while passing through eye of shaft was killed by balance cage.

3. August 8.—Alexander McEachern, chain runner, Intercolonial Colliery, was killed by rake of full tubs, starting from the bottom of the slope.

4. August 18.—J. McGrath, miner, Goldenville, killed by fall of stone from a scaffold he was taking down.

5. September 28.—James Shanahan, driver, Little Glace Bay Colliery, killed by fall of stone from roof.

Among the non-fatal accidents, one occurred at the mine of the Pittsburgh Gold Mining Company, Tangier: James Conrod was engaged in loading a hole with a cartridge of frozen gelatine dynamite with a wooden rod, when it exploded, and severely injured him and his partner, Henry Cluttenburg, Jr., about the face.

John Jesse, a collier at the Sydney Mines, was burned by a spark from his lamp igniting some powder he was pouring out. At the Chiegnecto mine a collier was injured by the premature explosion of a shot he was in the act of firing. A miner named David Slack had his hand severely injured at the Londonderry mines by the explosion of three dynamite caps.

At the Albion Mines, a roadsman, named Daniel Gillis, had his hands burned by a small accumulation of gas in a head in the mine bord.

Falls of roof and coal caused several fractures of limbs.

At the gold mines of Mr. B. M. Davidson, at Mount Uniacke, John McGaskill fell about 60 feet in the shaft, and sustained very serious injuries.

A trapper at the Albion mines named Robert Harvey left his post, and was injured at a counter balance.

Last year a fatal acccident occurred to a man while riding in a slope, this year a man was injured at the Chignecto Mines in a similar manner.

MISCELLANEOUS.

The Board of Examiners appointed under Section 10, Chap. 5, Acts of 1881, have held the first examination of men desiring to obtain certificates of competency as Underground Managers and Overmen of coal mines.

Certificates of competency as underground managers were obtained by:

Thomas Scott,	Springhill Mines.
Henry Swift,	" "
James Baird,	Chignecto "
Thomas Routledge,	Reserve "
Hugh Campbell	Gowrie "

Certificates of competency as underground overmen were obtained by:

Alexander McDonald,	Albion Mines.
James Rogers,	" "
George Wilson,	Chignecto "

A number of certificates have been granted to men who have held the above positions for five years, and whose qualifications by actual service are sufficiently ascertained. As these certificates are not of the same value as those gained by men successfully passing the examinations, it is expected that a large proportion of those holding them will shortly present themselves for examination.

While the results of the examinations showed in many instances careful preparation and good practical knowledge, it was evident in all cases that a correct understanding of the principles of ærostatics, chemistry, &c., were wanting, and necessarily so. It would be highly desirable that some means should be provided in the principal mining centres to afford to the mining class an opportunity of acquiring these fundamental principles.

At the present day every occupation dealing with the world and its numberless products, calls in all the aid that the most advanced discoveries in science can afford or promise. This is especially true of the miner, who can win the treasures of the rocks only by availing himself of every fresh discovery of the laws governing the formation and changes of the mineral he seeks, and the material he employs to carry out his plans. I have referred fully to this in a paper on the subject of the training of Mining Engineers published in the transactions of the Nova Scotia Institute of Science.

In the United States the subject has received attention. In Ohio it was proposed that all applicants should pass an examination for a certificate of competency, except those who had been " mining bosses" for two years previously to the passage of the bill. The act was not passed, but will be reintroduced this year.

Circulars were sent to coal operators in Pennsylvania by the Inspectors to ask their opinion as to the necessity of a system of certificated " mine bosses." The majority of the answers are favorable to its adoption, but the subject does not appear to be considered of pressing importance.

The law prescribes that after the first day of January, 1884, the positions of underground manager and of overman in our coal mines must be filled by certificated men; the agents of the various mines will therefore be obliged during the present year to see that their staff is composed of duly qualified men. Those requiring such certificates must also see that they qualify themselves, as delay may cause them much inconvenience and loss of time.

French Commission.—The report of the French fire damp Commission, so far as it has been made public, promises to be a valuable contribution to mining literature. The products of the combustion of fire damp were found by the Commission to vary according to the proportion of air mixed with it. When there is less than 9.5 per cent of gas in the air, carbonic acid and water were formed; beyond that limit, however, some carbonic oxide is also formed, and some marsh gas and hydrogen remain unconsumed.

According to the researches of the Commission, fire damp is inflammable when present in the air to the extent of 5.8 per cent; and the limit of inflammability is reached again at 16.5 per cent. The temperature of its ignition is about 740° Celsius, or 1364° Fah., but at this temperature the time of contact must be extended to several seconds before ignition. Practically this makes the point of ignition a white heat.

It is admitted by the Commission that variations in barometric pressure exert but little influence on the exudation of fire damp from the faces of solid coal. It is, however, believed that rapid falls of the barometer may make the gas in old works, goaves, etc., enter the galleries. They therefore attach but little importance to the variations of the atmospheric pressure, as influencing conditions favourable to the accumulation in mines of unusual quantities of gas.

Several anemometers were tested by the Commission and the Bourdon was found the most reliable. The Mueseler lamp was considered the best of those in common use. Electric lighting does not appear to the Commission to be adaptable to the requirements of collieries. They confess that they have been unable to suggest any remedy for the danger of shot firing in fiery mines, and admit that explosions are not inevitably preventable, but that every attention should be paid to those circumstances of increased depth and greater activity of extraction which more and more characterise coal mining.

There can be little doubt that naked lights and the use of gunpowder are directly responsible for the great majority of fatal explosions. It is found that, wherever in fiery districts the use of powder and open lights has been discontinued, the loss of life from ignition of gas is very materially diminished.

In this connection the following table is of interest. It is from the report of the Belgian Commission, and shows the explosions that have occurred in Belgian mines from 1821 to 1879, divided as follows:—

Causes.	1821–50	1851–79	1821–79
Naked lights	49	29	78
Opening of lamps	48	33	81
Rapid movement of lamps	5	5	10
" currents of air	7	2	9
Defective lamps	17	32	49
Spontaneous combustion	1	1	2
Ventilating furnace	18	1	19
Fires at bank	4	4	8
Unknown	21	15	36
Gunpowder	47	73	120
	217	195	412

From this it will be seen that not only is gunpowder credited with causing the greatest number of explosions, but that the proportions are increasing.

Underground Fires.—It has been customary at some of our mines to leave the smalls, from holing and riddling underground, with the view of avoiding the expense of drawing and dumping them. The practice is suspected of having been the cause of fire in one or two instances in this Province. It is well known that such accumulations are capable of igniting after a long lapse of time, and those who have been following this custom should see that the prevention of a temporary inconvenience does not lead to serious trouble and loss.

The following notice bears directly on this point. The Seghill Colliery is one of the oldest works in the celebrated Hartley Steam Coal, having been sunk in the year 1822, and won out in the years following.

It was the custom in those days to leave all the small coals, got in holing, underground, and it now appears that spontaneous combustion has taken place, and those small coals are burning, and the shale above the seam has also been ignited, and has been burnt for a considerable height above the seam. Great exertions are being made to extinguish the fire by pouring on water, and also by cutting out the debris from the parts where the fire has been extinguished. It is expected that the fire will be subdued, and when that is accomplished the district where it occurred will be walled off by means of bricks and cement.

The Composition of the return air of Collieries.—The following summary of Dr. Winkler's analyses, made for the Commission engaged in the revision of the rules for the safety of mines in Saxony, is of interest. It includes analyses of the return air in gas free and fiery mines, three pits being selected as types in each of the three coal mining districts, and samples being taken on working days and on Sundays.

The constituents determined by analyses were:—Dust, water vapor, oxygen, nitrogen, carbonic acid and fire damp.

The dust was separated by filtering the air through spun glass, but

in no case was an appreciable weight obtained from ten litres. If a weight of even one milligram had been obtained the whole amount of dust carried in the air could not exceed 43 kilograms in twenty-four hours, which shows that the air in these mines is practically free from coal dust. This is perhaps due to the circumstance that experiment showed that the air was practically at its point of maximum saturation with water.

None of the methods hitherto in use were found to be sufficiently delicate for the determination of small quantities of marsh-gas, and therefore a new plan was adopted, of passing from 5 to 8 litres of air which had been previously freed from every trace of carbonic acid over red-hot oxide of copper, and collecting the carbonic acid, formed by the combustion, in baryta-water. The volume of carbonic acid found corresponds to an equal volume of marsh-gas burnt. Nitrogen was calculated by difference in the ordinary way.

The results of the analyses, which are given in detail, show a considerable variation in the composition of the air, and more particularly in the proportion of carbonic acid. As the amount of this constituent is only slightly variable in atmospheric air, the variation is due to the products of respiration and the burning of lamps, but more particularly to gaseous exhalations from the coal and joints in the rock. That the latter is the more important source, is evidenced by the slight difference in the composition of the air on Sundays and working-days, the amount of carbonic acid being, as a rule, only slightly in excess on the latter. Marsh-gas appears to be invariably present, the amount being sometimes greater on working-days than on Sundays, and sometimes the reverse. The variation in these constituents is as follows, in volume, per cent:

COLLIERIES AND DISTRICTS.	MARSH GAS.		CARBONIC ACID.		OXYGEN.	
	Week-day.	Sunday.	Week-day.	Sunday.	Week. day.	Sunday.
Lugau, Chemnitz..............	0·108	0·092	0·483	0·448	17·751	17.693
Bockwa-Hohndorf, Chemnitz....	0·156	0·111	0·146	0·143	18·613	18.652
Deutschland, "	0·138	0·115	0·122	0·117	18·079	17.872
Brueckenberg, Zwickau........	0·256	0·124	1·020	0·380	17·958	18.806
Oberhondorf, "	0·069	0·054	0 345	0.285	18·536	18·667
Von Arnim's, "	0·018	0·025	1·076	0 952	18·641	18·461
Zaukeroda, Dresden............	0·021	0·017	0·432	0·539	19·170	19·690
Von Burgk's, "	0·125	0·146	0·281	0·222	18·611	18·828
Hanichen, "	0·041	0·048	2,717	2·662	18·432	18·526

COLLIERIES AND DISTRICTS.	WATER VAPOR.		NITROGEN.		VOLUME OF UP-CAST CUB. MET. P. SECOND.	
	Week-day.	Sunday.	Week-day.	Sunday.	Week-day.	Sunday.
Lugau	3·475	3·446	78·183	78·320	4·028	4·236
Bockwa-Hohndorf	4·190	4·187	76·894	76·907	7·732	6 043
Deutschland	3·384	3·331	78·277	78·565	3·162	2·882
Brueckenberg	3 422	3·425	77·345	77·265	4·529	4·233
Obenhohndorf	3·195	2·810	77·835	78·184	3·130	3·238
Von Arnim's	2·282	2·745	77·984	77·958	9·640	10·099
Zaukeroda	2·888	2·525	77·489	77·228	3·566	3·049
Von Burgk's	3·066	2·948	77·917	77·856	6·558	7·290
Hanichen	3·193	3·057	75·617	75·707	4·515	6·280

The variation in the proportion of nitrogen to oxygen is not only affected by the consumption of the latter by miners and their lamps, but there also is an actual increase in the former from the gas given out by the coal. It was not found possible to determine this, as that would have required elaborate measurements and analyses of the in-take air, which, under the conditions of the investigation, were impossible. An attempt has, however, been made to determine the actual amount of gas given off by the coal in twenty-four hours, by assuming the composition of the in-take air, the result being given in the following table, all the figures being given in cubic meters, equal each to 35 cubic feet:

COLLIERIES.		Volume down-cast.	Volume up-cast.	GIVEN OFF BY COAL.				
				Nitrogen.	Carbonic acid.	Marsh-gas.	Water-vapor.	Total.
Lugau,	Week-day..	296,744	347,299	39,047	1,559	372	9,557	50 555
"	Sunday....	311,690	365,990	42,454	1,514	333	9,994	54,300
Bockwa-Hohndorf,	W...	598,519	668,044	44,781	734	1,043	22,967	69,525
" "	S...	468,756	522,115	34,299	558	580	17,922	53,359
Deutschland,	W..	227,532	273,053	37,578	236	378	7,329	45,521
"	S..	209,278	249,005	32,701	204	286	6,586	39,727
Brueckenberg,	W..	338,087	391,136	37,653	3,850	1,000	10,546	53,049
"	S...	323,441	365,731	30,790	1,255	454	9,791	42,290
Oberhohndorf,	W..	241,541	270,432	21,258	836	186	6,611	28,891
"	S...	252,368	279,763	21,797	696	151	5,751	28,395
Von Arnim's,	W..	730,330	810,864	60,059	8,084	123	12,268	80,534
"	S...	557,492	850,522	68,818	7,425	192	16,595	93,030
Zaukeroda,	W..	284,293	308,102	16,018	1,216	64	6,511	23,809
"	S...	248,787	267,610	13,759	1,349	47	4,677	19,823
Von Burgk's,	W..	495,891	566,610	55,418	1,387	709	13,206	70,720
"	S .	556,650	629,856	57,228	1.165	918	13,895	73,200
Hanichen,	W..	346,104	390,096	23.827	10,458	160	9,549	43,996
"	S...	483,818	542,592	31,722	14,249	260	12,543	58,774

From this, it appears that the total increase in volume of the return over the down-cast current, when reduced to the same temperature and pressure, varies from 7·4 to 16·6 per cent in extreme cases. In order to convey to the reader some idea of the quantities thus escaping from the coal, Dr. Winkler has calculated the carbonic acid

as equivalent to coal containing 70 per cent of carbon, and he finds that the weight of carbonic acid given off by the coal is equivalent to from 400 to 17,750 pounds of coal; and that of marsh-gas, from 108 to 1770 pounds, in twenty-four hours.

Dr. Winkler, in conclusion, points out that these figures refer only to a particular condition of things, the observations having all been made during the month of August, 1881; and to get at the real variations in the composition of the air, it would be necessary to continue them over a longer period, say an entire working year. He considers, however, that such a series of observation would be, perhaps, the cheapest, and probably the shortest method of solving questions of the highest interest for the well-being of coal-miners.

The consideration of this point leads naturally to the use of gunpowder in mines giving off gas. All appear to agree that a line defining the use or disuse of gunpowder cannot be drawn in an arbitrary manner. The attention which is paid to every new invention which presents the slightest claim to supercede gunpowder, shows that the conviction is wide spread that the days of gunpowder in coal mines will shortly be numbered. The interests of the safety of workmen would justify its disuse in every mine known to give off gas, even in small quantities. The figures given above show that even in countries where the proper working of mines has received a most enlightened and careful consideration, it originates the most terrible catastrophes.

Whenever gas appears in a mine in tangible quantities, no assurance can be given that the amount will not increase, rapidly or slowly, or that blowers will not be met capable, on ignition, of baffling the efforts of miners to extinguish them.

Expectations were raised that the use of a "wad" of water on top of the ordinary charge of gunpowder would prevent any dangerous flame, while allowing the powder to exert its strength on the coal. Practical tests, however, appear to show that it is little safer than gunpowder used alone.

The system of "blasting" with lime cartridges consists in placing in the shot hole an iron tube having on one side a perforated groove. A cartridge of caustic lime is introduced into the tube and slightly rammed, after which a force pump is attached to the end of the tube and a little water forced in. The expansion of the lime and the heated vapour separates the coal without the danger of ignition of gas.

Practical trials appear to show that in a firm coal, unbroken by lypes, etc., this system is cheaper than wedging. Detailed experiments and estimates are still wanted to show if it can rival gunpowder in bords, with respect to certainty and cheapness. Should these show that any approach can be made to an equivalence in expense, there can be no doubt that the important element of increased safety will secure its application in all seams showing gas in quantities liable to cause damage.

WIRE ROPES.

The Government Mine Inspection for the Dortmund district have issued the following rules for calculating the strength of winding ropes:—1. For iron wire ropes; 6 is assumed as the factor of safety. The weight to be raised (in kilogrammes) is equal to 7·31 times the square of the diameter of a wire (in millimetres) multiplied by the number of wires. Where pounds and inches are used in place of the kilogrammes and millimetres the factor, 7·31, must be replaced by 10,500. Where the diameter of the wires cannot be accurately measured, the following rule can be used to obtain it:—The diameter of the wire multiplied by the square root of the number of wires in the rope is equal to 6·6 times the diameter of the rope. 2. For ropes manufactured from aloe fibres. The weight to be raised (in killogrammes) is equal to 110 times the sectional area of the rope (in square centimeteres). For pound and inch units the factor, 110, becomes 1576. In place of measurement for the area which is difficult accurately to attain, the following rule may be used as a check: The weight to be raised (in killogrammes) is equal to 942 times the weight of the rope per running metre, or 3100 times the weight of the rope per running foot. 3. For hempen ropes the weight to be raised (in killogrammes) is equal to 95 times the sectional area of the rope (in square centimetres). For the pound and inch units the factor 95 becomes 1361. In place of measurement for the area, or rather as a check on the result, the following rule may be used:—The weight to be raised in killogrammes is equal to 985 times the weight per running metre of the rope, or 3250 times the weight per running foot. When the rope is tarred the result given by the first rule must be multiplied by ·8, and the result given by the second rule by ·84. 4. For cast steel wire ropes the factors 7·31 and 10,500 given above for iron wire ropes should be replaced by 15 and 22,000 respectively. When men are being raised it is an observed rule that the weight in the cage should never exceed half the weight of mineral which is raised at one time.

The following form of wire rope cleaner and lubricator, applicable to flat and round ropes, has been satisfactorily used in England.

The ropes to be cleaned pass between a pair of flat wire brushes, the pressure of which on the ropes can be adjusted by a screw; two hoppers are placed below the brushes in order to catch the dirt which is removed. Lower down the ropes pass between a pair of revolving brushes, and then between a pair of rollers of soft material, which exert an adjustable pressure. These rollers are geared to the revolving brushes, and cause them to move in a direction contrary to that of the ropes. For cleaning the rope revolving wire brushes are used, and these, as they rotate, penetrate between the strands of the rope and leave the latter clean for receiving the lubricant. When oil or grease is to be applied, the rotating wire brushes are replaced by strong hair brushes, which are fed with lubricant from feeders above, this lubricant being thoroughly brushed into the outer strands of the rope. The changing of the revolving brushes can be effected very readily, and the brushes act equally well whether the rope is running

up or down. It is claimed for the machine described that, from the thorough manner in which the ropes are cleaned, their condition can be more readily and accurately determined by inspection, while, from the systematic manner in which the lubricant is applied, there is a great reduction of waste, and a better quality of lubricant can be profitably used.

COVERING FOR STEAM PIPES.

In my report for the year 1880 I gave some extracts from a paper read by Mr. W. J. Bird before the North of England Mining Institute on the condensation of steam in pipes. This gentleman has continued his researches into this matter, and the following remarks from his second paper will prove interesting.

A test was made of the comparative non-conducting powers of the following materials.

1. Silicate cotton. This is made by forcing air or steam through melted furnace slag. In its normal condition a cubic foot weighs 12 lbs. The cost of the material as applied to steam pipes is 2d. per square foot for each inch in the thickness of covering.

It was tested when enclosed with wood lagging, and external tubes of straw-board or sheet iron.

It was also tried in the form of mattresses which are sewed closely together over the surface to be protected, and then painted. A test was made of it in the condition of a cement formed by pulverising the silicate into a clay wash.

Toopes patent covering, composed of an inner circle of asbestos backed with compressed paper, and two outer circles of the same material with hair-felt between the layers. It is made about three-quarters of an inch in thickness, and costs tenpence-halfpenny per square foot.

A patent composition of a plastic and fibrous nature, which is mixed with water and plastered on the pipe. Its cost is about three-pence-farthing per square foot, at the thickness of one and a half-inches.

Hair-felt was also tested. Its cost is three pence halfpenny per square foot at a thickness of three quarters of an inch.

The following table shows the observations made on the various materials applied to two pipes, one 2·5 inches, the other 10·6 inches in diameter, external measurement.

Name of Material.	Small Pipe 2.5 (in.) Tem. in deg.° Fah.				Large Pipe (10.6 in.) Tem. in deg.° Fah.			
	Thick-nes.	Pipe	Air	Diff.	Thick-ness.	Pipe	Air	Diff.
Uncovered pipe...	..	252	42	212	....	251	67	184
1. Silicate cotton..........	¾	134	42	92	1½	126	67	59
2. Silicate cotton mattress	¾	108	42	66	....	....	....	....
3. Silicate cotton cement..	¾	165	41	124	....	....	....	....
4. Toopes patent covering..	¾	85	42	43	¾	111	67	44
5. Patent composition.....	....	....	....	....	1½	124	67	57
6. Hair-felt	....	....	....	....	¾	142	68	74

The heat loss of these steam pipes is due partly to radiation, and partly to air contact. If these quantities are added the total heat loss per hour per square foot is arrived at, from which the heat loss per foot length can be readily got. By comparing the heat loss of the covered and uncovered pipe, the percentage of heat retained by the coverings and their comparative efficiency will be seen, as in the following table :—

Material.	Small Pipe.				Large Pipe.			
	Thickness.	Heat loss units per hour. pr. sq foot.	Heat loss units per hour. pr. ft l'gth.	per c'nt. effi-c'cy	Thickness.	Heat loss units per hour. pr. sq foot.	Heat loss units per hour. pr. ft l'gth.	per c'nt effi-c'cy
Uncovered Pipe..............	..	514·3	336·6	...	..	357·7	990.8	...
1. Silicate Cotton.............	¾	157·1	164·5	51·1	1½	89·9	320·0	67·7
2. " " Mattress.....	¾	107·7	112·8	66·5	..	....	....	...
3. " " Cement	¾	248·6	260·3	22·7	..	....	....	...
4. Toopes patent covering......	¾	65.2	68·3	79·7	¾	66·4	208·5	78·9
5. Composition...............	..	....	....	...	1½	85·7	305·1	69·2
6. Hair felt............. ...	..	....	....	...	¾	118·5	372·0	62·3

Mr. Bird having compared the heat-retaining efficiency of these materials, proceeds to estimate the absolute saving resulting from their adoption. He assumes the case of an underground engine deriving its steam power through a 10·6 inch pipe from boilers at bank 1000 feet distant. The total loss in heat units, generally speaking, is got by multiplying the loss per foot length by 1,000. Let it be assumed that one cubic foot of water, at 60 degrees, in the boiler evaporated to steam at any pressure, is equal to one nominal horse power, then 69,674 heat units is equal to one horse power. The loss of horse power in each case can then be arrived at. The cost of fuel is calculated at two cwts. of coal per 24 hours for each horse power at the rate of four shillings per ton.

Material.	Steam Pipes. 10·6 inches external diameter, 1000 ft. length.					
	Thickness.	Horsepower.		Cost of Material.		Fuel
	Applied	Loss	Sav'g	Total	per H. P. saved.	saved pr. annum.
				£. s. d.	£. s. d.	£. s. d.
Uncovered Pipe	......	14·22	——	——	——	——
Toopes' pat. covering.	¾ inch	2·99	11·23	137 9 11	12 15 9	81 19 7
Composition	1½ "	4·38	9·84	48 4 2	4 18 0	71 16 8
Silicate cotton......	1½ "	4·59	9.63	44 10 0	4 12 5	70 6 0
Hair-felt	¾ "	5·34	8·88	45 16 3	5 3 2	64 16 6

This table shows how large and important a saving is effected by the use of non-conducting materials. The results arrived at in England are of even more importance in this country when the length and low temperature of our winters are considered. There are numerous other compositions, etc., used for this purpose, some of which are of equal value with those experimented on.

Pumps.

The great depth reached by the miners of the Western States has called for much ingenuity in the construction of pumps, with a view both to economy and power. Our mines are as yet comparatively shallow, but many of the collieries work through slopes, and are compelled to convey steam and water for long distances. In this connection a paper by Mr. Joseph Moore, of San Francisco, on Hydraulic Pumps, will be found of interest.

In the history of the early sinking on the Comstock lode it was found that a limit was reached beyond which long rods, and a speed confined between three and six strokes were not the characteristics required by efficient pumps. When the joint pump shaft was nearing the Savage incline at a depth of 2,450 feet, hot water was met in such quantity that the question became immediately one of abandonment, or of greater pump power. At this crisis the Risdon Iron Co., of San Francisco, proposed to put in hydraulic pumps to raise 1,600 gallons of water per minute from the 2,400 feet level to the Sutro tunnel at 1,600 feet from the surface, and an additional quantity of 800 gallons per minute from the proposed 3,200 feet level to the 2,400 feet level. After some hesitation their offer was accepted, and the following machinery erected and put in successful operation.

It consisted of a steam engine placed at bank, working a hydraulic accumulator which by pipes worked a hydraulic engine 2400 feet from surface to raise water by plungers to the level of the Sutro tunnel. The engine is compound, having cylinders 35 and 70 inches in diameter, working direct four pumps 8½ inch plungers. These pumps force the water through an 8 inch pipe to an air vessel 25 inches internal diameter, and 70 feet high, and thence down the shaft to the hydraulic engines at the 2400 feet station, the exhaust water being returned to the surface through 10 inch pipes to be again pumped down the mine.

The pressure in the air-vessel is 960 lbs., consequently the pipes at the bottom have to sustain a pressure of about 2000 lbs. to the square inch. Arrangements have been made so that of the electric signals from the hydraulic pumps should fail, and the pumps stop without the knowledge of the engineer on the surface, no damage would result. An air-compressor supplying 60 cubic inches per minute at 1000 lbs. pressure was found amply sufficient to keep the air-vessels supplied with air. Underground there are two air-vessels on the discharge, and four on the inlet pipes. These vessels are 18 feet high, those in the discharge pipes being 14 inches, and those in the inlet pipes 13 inches in diameter. These keep the fluctuations within a few pounds pressure upon the columns. By an ingenious arrangement a feeding chamber is provided for filling the air-chamber at each station.

It is found that the proportion of power developed by the engine pumps is 90 per cent. The pumps raise daily per minute between 1600 and 1700 gallons, and could raise 10 per cent more. The engine is developing actual water pumped, not indicated horse-power in the cylinder of the engine, about 17 to 18 horse-power per cord of wood, the cord corresponding to about 1100 lbs. of coal, which compares very favourably with the best mill engine in California, and is better than the other pumping engines.

A similar system has been proposed by Mr. Baxter, well known as the inventor of the hot-air engine bearing his name. He uses a steam-pump on the surface by a water column, employs it to drive an ordinary rotary or direct acting pump underground. This system virtually does away with steam and pump rods, and permits the use at bank of compound and other economical forms of engines. The exhaust water can it is stated be satisfactorily returned to bank in the delivery pipe. This system, if efficient, would be found useful in many cases in mines where the use of steam-pipes and rods is inconvenient, and whose depth and operations do not warrant the introduction of the more expensive pump described above.

DAMS.

During the construction of the tunnel under Dorchester Bay at Boston, it became necessary to construct a brick dam to stand the pressure of a water column, 162 feet high, and, as it was intended to shut off a leak amounting to 240,000 gallons per 24 hours, it had to be water-tight. Mr. D. Stauffer gave the following description of this work before the Engineers's Club of Philadelphia :

The tunnel section at the point selected for the dam was practically 10 feet square. The bulkhead was built directly across the tunnel, 50 feet in front of the heading where the water was struck. Plank dams filled with puddle clay were first thrown across the tunnel, each side of the bulkhead site, and a 6-inch iron pipe used to carry off the water during construction—the pipe being built into the brickwork. An arched form was adopted, 4 feet thick at the crown and 2 feet rise in a span of 10 feet. Hard-burned bricks were used, laid in mortar made of one part English Portland, one part Newark

Rosendale, and two parts clean, sharp sand—a compound found equally strong with English Portland, and sand one to one, and having the advantage of working smoother on the trowel, and adhering better to brickwork in wet places. Skewbacks for the arch were roughly picked out in the rock at the sides, After the cement had set, the water was shut off by screwing, a cap on the outer end of the 6-inch pipe. The pressure against the wall was $72\frac{1}{10}$ pounds per square inch, or about 519 tons distributed over the face of the bulkhead. The wall was tight for about 48 hours ; then water came through the *brick* itself, rather than through the joints, in amount equal to one-half the original volume. The water was let off and a second experiment tried. The main wall was torn down sufficiently to allow men to pass behind it, and a second wall only 12 inches thick was built back of the first, and two feet distant. The space between these walls was well rammed with puddle clay, extending to the rock on all sides. The second wall was made purposely light, as its yielding to the pressure would only more effectually consolidate the clay between it and the unyielding wall in front. The bond used in the main wall was one so laid that there were no continuous horizontal joints through the wall. The result of the last construction was completely successful. The tunnel is driven through a formation of clay slates, and conglomerates for its entire length ; rock, very seamy, and much water encountered.

In mining bulkheads, which often must carry much greater pressures, the practice is to let the water rise slowly behind the bulkhead, by allowing a portion of the water to flow through a safety-valve at the bottom of the level. It has been the experience in all such cases that in the beginning quite a quantity of water will come through the pores of the brick-work, which is said to be "sweating." Gradually, however, the pores are filled by carbonate of lime, etc., and a thick coat of that substance forms on the face of the bulkhead, completely cutting off the entire flow of water. A column of from 400 to 500 feet has been borne for many years by such bulkheads.

COAL WASHING.

One of the most serious objections to coal washing is the quantity of the fine dust carried off in the slimes. The adhesion of the water to the coal seems almost to overpower the force of gravity. The Hochstrate coal washer, as used during two years at the Rheinpreussen Colliery, claims to meet this difficulty. The finest grades of the coal do not pass into the water-jig, but are subjected to a jet of air as they slide down an inclined plane. The effect of this treatment is to separate effectually the fine dust which is collected in a chamber. About 30 per cent. of the material charged to the blowing apparatus goes to the dust chambers, and as the dust is almost pure coal, there is a great saving over washed coal, as at least two-thirds of the fine coal is wasted by the ordinary methods.

COAL CUTTING MACHINERY.

During the past few years the use of power drills, etc., for cutting

coal has been extending in the Western States of America, and much of the American soft coal imported into Canada has been thus mined. Mr. G. D. Whitcombe, of Chicago, owner of the Harrison Mining Machine, has had one of his coal cutters built here recently, and purposes trying it in the Cumberland district. It is driven by compressed air, and is said to work rapidly, and to effect a very considerable economy. The machine consists of a drill with a fish tail point, driven rapidly against the coal, the direction, length and speed of the blows, being under the control of the operator. The machine is compact and readily handled, and, from its appearance, should not be at all liable to get out of order. The importance of being able in any way to increase the output of our mines during the season permitting of shipments, should render the study of all mechanical helps to rapid coal cutting of particular interest to our operators.

PULVERISERS.

Centrifugal pulverisers have for a number of years been used in England and on the Continent, and are now beginning to attract the attention of mill men in America. Among the best of these may be mentioned the Lucop and Cook pulveriser. It consists of a pair of arms mounted on a horizontal shaft, each carrying an iron ball weighing from 20 to 60 lbs. These balls slide in a stop in the arms, and are forced against a ring by the centrifugal pressure. The ore is subjected to an alternate percussive and grinding action, repeated until the desired fineness is reached. They are found to work well on all but the hardest varieties of quartz vein stone, and are easily kept in order.

CONCENTRATION.

The question of the adaptability of our ores of Gold, Copper and Lead, to concentration, has been frequently brought forward.

Many persons consider that the concentration of ore is a comparatively simple business, and hence the frequent disappointments experienced by those who have attempted this delicate operation with appliances lacking practical and technical requisites.

There are three points influencing any process of concentration, viz: The specific gravity, size, and shape. The main point however is the difference in specific gravity of the various bodies, when reduced to particles of the same size. In this case the greater the specific gravity the readier and more complete is the separation, as for example Galena (sp. gr. 7·5) is readily separated from quartz (sp. gr. 2·6), and less readily from Pitchblende (sp. gr. 6·47), Red Copper ore (sp. gr. 6·0), etc.

When an attempt is made to crush any rock for the purpose of concentration, it is found that when the material requires to be reduced to small particles, to completely free the mineral from adhering gangue, there is a large percentage formed of an almost impalpable dust. It is practically known to gold prospectors that gold and boulders are frequently found lying together in river channels. Without giving the physical reasons, it may be stated that in many respects

large particles of a light mineral move similarly to small particles of higher specific gravity. In the concentration, more particularly of gold and silver ores, the success of the operations is influenced by the shape of the particles, for scales and thin plates of a heavy mineral will float, and settle with a reduced speed rendering them liable to influences otherwise operating only on minerals of a lesser specific gravity.

From the above considerations it will appear that the application of any of the established methods of concentration to the ores most commonly met in Nova Scotia must be preceded by a careful study of the mineral and its accompanying gangue.

The first question naturally is whether the ore will pay for concentration, or prove more profitable if enriched by careful hand picking. All ores containing silver, as an accessory mineral, in the form of silver glance, etc., and many galena ores carrying their silver as minute particles of brittle silver ore, and gold ones carrying the metal in small masses of pyrites, etc., belong to the latter class. It is true that by sacrificing half of the metal sought for, the remainder may often be saved at a profit; but this applies only to the richer grades of ore. In the case of our gold veins carrying gold and silver with variable quantities of blende, pyrites, galena, etc., the usual practice has been to crush the ore with a view to saving the free or coarse gold, and to allow the pyrites, etc., to pass away.

Lately efforts have been made with a view of concentrating the pyrites, etc., from the tailings. So far these attempts generally have not yielded concentrates at all corresponding to the assay values of the ores. This may be attributed, among other causes, to the loss sustained by minute sub-division of the accessory minerals during the process of pulverisation necessary for obtaining the gold, which leads to an amount of slimes not manageable by any of the attempts yet made here to classify them. It may therefore be questioned if the stamping as practised here for retaining coarse gold by amalgamation is quite suited as a preliminary preparation for economical concentration.

The remark is frequently made that "rustiness" is the cause of much of the loss that is met in quartz milling. The following notes, from a paper read by Dr. Thomas Egleston before the American Institute of Mining Engineers, are of interest on this point:—

So called "rusty gold" from placers is not often met. It presents a brownish coating, and a colour redder than that of ordinary gold. Should the coating not cover the gold all over, it amalgamates readily, but if the covering is complete it may resist amalgamation. This film will crack off, and appears to be silica, or a silicate of iron, showing fine particles of gold under the microscope.

This is probably the only case of "rustiness" occuring in nature, but owing to the various processes of mining and milling, other causes retard or prevent amalgamation.

These may be divided into mechanical and chemical.

Thus a piece of gold hammered until the surface interstices are closed, will resist amalgamation for a considerable time. If it be heated, and cooled slowly, amalgamation takes place rapidly.

A strip of clean gold dipped into a solution of sulphureted hydrate of ammonia, and also into one of sulphureted hydrogen, was allowed to dry, and both these reagents were found to prevent amalgamation.

Gold exposed to fumes of sulphur would not amalgamate until heated sufficiently to permit the volatilisation of the latter. Alloys of gold with arsenic and antimony amalgamated readily. Phosphide of gold was found not to be acted on by mercury.

It will be seen that the stamp-mill is not, in all respects, a rationally designed machine. The action of pounding is likely to put some of the gold into such a condition that the mercury will not touch it, and to flour the gold as well as the quicksilver. There is, besides, in the mill every probability of the introduction of grease or greasy substances, like the powdered hydrated silicates of magnesia and of alumina, (slates) which not only froth but coat the gold with as lime which prevents the action of the mercury. If the water used in the mill is not pure, there is a further likelihood of the introduction of sulphureted hydrogen, and of other soluble sulphides, which act superficially on the small particles of gold and prevent the action of the mercury. To meet these points it would almost appear that the principle of the arrastra acting on the ore broken to a coarse powder would have to be again adopted.

During the past year the mineral resources of the Province were well illustrated at the Dominion Exhibition, held at Kingston, by the set of ores, etc., sent by your Honourable Government. The specimens were accompanied by a pamphlet giving a summary of the latest information relating to our mines which was prepared by me, at the request of the Government, for distribution there. As I have received numerous applications for copies during the last few months, I trust that it has been of some service in drawing attention to so important a matter.

The following papers relating to the Geology and Mineralogy of Nova Scotia have been published during the past year:

H. Fletcher. Richmond Co., C. B. Geological Survey of Canada.

E. Gilpin. The Minerals of Nova Scotia. Report to the Government of Nova Scotia.

E. Gilpin. The Gold Fields of Nova Scotia. North of England Institute of Mining Engineers.

E. Gilpin. The Northern outcrop of the Cumberland Coal Field. N. S. Institute of Natural Science.

Dr. Honeyman. Nova Scotia Geology, Superficial. Ibid.
Metalliferous Sands. Ibid.

C. Hoffman. Analyses of Nova Scotia Minerals. Geological Survey of Canada.

S. D. Macdonald. Geological Notes. N. S. Institute of Natural Science.

I have the honor to be, Sir,

Your obedient servant,

EDWIN GILPIN, Jr.,
Inspector of Mines

LIST OF MINERAL LEASES (OTHER THAN GOLD.)

No.	Lessee.	District.	Area Sq. Miles.
	COPPER.		
	ANTIGONISH COUNTY.		
2	Ross, Sarah, and others		1
	COLCHESTER COUNTY.		
	Moir, Wm. C., et al	Tatamagouche	10½
	LEAD.		
	HALIFAX COUNTY.		
1	McClure, Chas. F.	Gay's River	1
	IRON.		
	PICTOU COUNTY.		
35	Carmichael, John R.	East River	1
43	Hudson, James	" "	1
	CAPE BRETON COUNTY.		
86	Brookman, S. J., et al	N. Side East Bay	1
91	Brookman, Phœbe	East Bay	1
102	C. L. Ingraham	" "	1
103	J. A. McKenzie	" "	1
92	Matheson, D., et al	" "	1
93	Brookman, S. J., et al	" "	1
84	Protheroe, Pryse	Cow Bay	1
	INVERNESS COUNTY.		
16	Inverness C. I. & R. Co.	Whycocomagh	1

Total Area under lease . . . . . . 22½ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*	Postal Address.
		ANTIGONISH CO.				
1	McKinnon, et al.		3			
		CUMBERLAND CO.				
44	Baker, John W.		1			
13, 14, 15	Black, C. H. M.		3			
21	Blight, James, et al		1			
47	Boston, C. M. Co		1		John Moffatt	River Herbert.
25	Campbell, Alex., et al		1			
32, 34	Campbell, Alex., et al		2			
35, 48, 49, 50	Campbell, Alex.		4			
31, 33, 37, 38, 40, 41, 45, 46	Campbell, John		8			
12	Cumberland, C. M. Co	Chignecto	4	Working.	*Jas. Baird*	Maccan
17	Domville, James		3		E. N. Sharp	St. John, N. B.
	Joggins, C. M. Association.	Joggins	2	Working.	B. B. Barnhill	Joggins.
	Joggins, C. M. Co.	Cumberland	2			
20	Kirby, Lewis R.		1			
18, 19	Livesey, John		2			
5	Lawson, C. M. Association.	Maccan	1			
42	Macfarlane, Alex		1			
51	Milner, Christopher		1			
53	Milner, Christopher		1			
1, 2, 3, 4	New York & Acadia Co.	Scotia	4	Working.	William Bennett,	Maccan,

43	Pugwash & Sp'ng H'l R. Co.		1			
16	Seaman, Gilbert		1			
24	Shannon, S. L.		2			
36, 39	Shannon, S. L. (in trust) et al		2			
6, 7, 8	Spring Hill Mining Co.	Spring Hill	3	Working.	*William Hall*	Spring Hill.
52	" " " "	" "	4	"	" "	" "
22, 23, 28, 29, 30	Styles Mining Co. (L'td)		5	....	J. S. Hickman	Amherst.
9	Victoria Coal Mining Co.		2			
26, 27	Wright, John V.		3			
			66			
		PICTOU CO.				
1	Acadia Coal Co.	Fraser.	1	Working.	H. S. Poole.	Stellarton.
3	" " "	Acadia	1	"	*J. Maxwell*	Westville.
42	" " "	Pictou	4	.. ....		
23	Allan, Sir Hugh, K't.	Vale.	3	Working.	J. B. Moore *John Greener*.	New Glasgow. Vale Colliery.
10	Gray, B. G.		1			
11	Haliburton, R. G., et al.		1			
	Halifax Co'y, (Lt'd.)	Albion	4	Working.	S. Cunard & Co *J. Rutherford*.	Halifax. Stellarton.
13, 14	Intercolonial Co'y		2			
12	" "	Drummond	1	Working.	Robert Simpson	Westville.
6	Kirby, Lewis R.		1			
15, 30, 31	Merigomish Co'y		3			
25	Nova Scotia Co'y	Black Diamond	4	....	M. H. Angell	Westville.
20	Price, D. E., et al.		2			
24	Richey, M. H.		1			
			29			

LIST OF COAL LEASES—(CONTINUED.)

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		CAPE BRETON CO.				
3	Archibald, Blowers	Gowrie	1	Working.	Archibald & Co. *Chas. Archibald*	North Sydney. Cow Bay.
2	Archibald, Thos. D.	"	1			
5, 28	Blockhouse Mining Co.	Blockhouse	2	Working.	R. Belloni	Cow Bay.
29	" " (*sea area*)		1			
72	Brookman, Samuel		1			
76, 77	" S., et al		2			
15	Caledonia C. & R. Co.	Caledonia	1	Working.	David MacKeen	Caledonia Mines.
31	" (*sea area*)		1			
30	Campbell, Alex		1		T. D. Archibald	North Sydney.
23, 25, 70	Cape Breton Co. (Limited)		3		F. C. Kimber	Louisburg.
14, 24	" " " "	Schooner Pond	2		*W. Routledge*	Reserve Mines.
49	" " " "	Reserve	1	Working.	"	"
64, 65, 68	" " " "	Lorway	3		"	"
69	" " " "	Emery	1		"	"
8, 9	Halifax Coal and Iron Co.	Ontario	1½	Working.	*John Sutherland*	Port Caledonia.
87	Cossit, Geo. G.		1			
	General Mining Association	Bridgeport	2		Rich. H. Brown.	Sydney Mines.
	" " "	Sydney	5	Working.	Cunard & Morrow.	Halifax.
	" " "	"	12			
27	" " (*sea area*)	"	5		*Joseph Simpson.*	Sydney Mines.
	" " "	Lingan	10	Working.	*Donald Lynk*	Lingan.
	" " "	"	4			
38, 39	" " "	Lingan	10			

10, 21	Gibson, John, et al........	....	2			
4, 12, 16	Glace Bay Mining Co.......	Glace Bay	3	Working.	E. P. Archbold . *Henry Mitchell*.	Halifax. Little Glace Bay..
75	Henry, W. A.............	....	1			
22	Ingraham, R. J. and J. L....	Halfway	1			
6, 13, 18, 19	International C. & R. Co...	International.....	4	Working.	R. Belloni...... *P. Johnstone*...	Cow Bay. Bridgeport.
71	Jennings, Edward	....	1			
47	LeCras & McInnes.........	....	1			
66	Merchants' Bank of Canada..	Gardener........	2			
74	Moore & Moseley..........	....	$1\frac{1}{4}$			
81	Morton, Lemuel J..........	....	1			
80	McDonald, James..........	....	1			
101	McDonald, W. B..........	....	1			
52, 53	McLeod, Hugh	....	2			
88, 89, 90	Paint, Henry N., and others.	....	3			
83, 85	Protheroe, Pryse	....	2			
73, 82	Reid, Thos. S. (*sea area*)...	....	2			
40, 41, 42	Ross, H. E , et al...	....	3			
79	Ross, W. J., et al (*sea area*).	....	1			
43	South Head Coal Co........	South Head	1			
32	Sword, Wm., (*sea area*)	....	3			
54 to 62	Sydney C. M. Co. (*sea areas*)	....	10			
46	Todd, A. Thorton..........	Collins	1			
67	Weatherbe & Kirby........	....	1			
78	Weatherbe, R. L., (*sea area*).	....	5			
34, 35, 36	Victoria C. M. C., (*sea area*).	Victoria........	5			
50, 51	" "	....	2			
			$131\frac{3}{4}$			

LIST OF COAL LEASES—(Continued.)

No.	Lessee.	Colliery.	Area Sq. Miles	Working.	Agent and *Manager*.	Postal Address.
		INVERNESS CO.				
5	Aylmer, John Evans Freke	Cape Mabou	2			
8	Evans, Thomas	Chimney Corner	1			
9	Evans, Thomas, *(sea area)*		1			
7, 12	Inverness C. I. & R. C.		2	Working.	Alex. Wright. / *D. McKay*	Moncton. / Broad Cove.
13	Murray, George	Port Hood	3			
4	Richey, M. H., et al.		1			
11	Ross, W. J.	Broad Cove	1			
6	Ross, H. E., et al, *(sea area)*		1			
14, 15	Smyth, Peter		2			
10	Tremaine, E. D., *(sea area)*		1			
17	McDonald, Hugh		1			
			16			
		RICHMOND CO.				
2	Marmaud, A. E.	Little River	1			
			1			
		VICTORIA CO.				
2	Campbell, Chas. J.	New Campbellton.	3		John McDonald.	N'w Campb'lt'n
3, 4, 5	Ross, William	Black Rock	5			
			8			

Total area under lease .... $255\frac{1}{4}$ square miles.

TABLE A.—COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Totals.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter..........	57,089	43,142	87,086	65,575	61,286	13,134	423	47	205,884	121,898
2nd Quarter	59,578	55,539	121,815	105,015	141,786	96,433	....	....	323,179	256,987
3rd Quarter...........	64,375	61,109	134,096	145,656	253,819	287,195	....	78	452,290	494,038
4th Quarter..	62,242	58,559	137,956	129,891	184,260	188,806	....	....	384,458	377,256
Total	243,284	218,349	480,953	446,137	641,151	585,568	423	125	1,365,811	1,250,179
1881	183,419	171,149	372,197	346,968	568,509	516,852	245	45	1,124,270	1,035,014
1880	143,085	134,671	461,811	434,922	422,884	380,848	4,930	4,218	1,032,710	954,659
1879	99,222	90,671	388,486	330,878	295,984	262,924	4,579	4,151	788,271	688,624

TABLE B. — COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia—											
Land Sales.......	23,782	17,443	113,720	78,672	1,122	4,021	68	......	138,692	100,136	238,828
Sea-borne........	4,146	141	43,568	8,085	158,675	5,509	......	......	206,389	13,735	220,124
Nova Scotia—Total...	27,928	17,584	157,288	86,757	159,797	9,530	68	......	345,081	113,871	458,952
Quebec............	56,029	2,532	123,985	1,536	197,000	1,892	57	......	377,071	5,960	383,031
New Brunswick.....	66,910	46,525	6,821	1,949	30,727	685	......	......	104,458	49,159	153,617
Newfoundland.......	......	......	1,145	......	76,561	2,026	......	......	77,706	2,026	79,732
P. E. Island.........	......	......	17,816	23,647	7,098	1,535	......	......	24,914	25,182	50,096
West Indies........	......	......	......	......	22,386	......	......	......	22,386	......	22,386
United States........	414	427	22,072	2,898	25,988	47,503	......	......	48,474	50,828	99,302
Other Countries......	......	......	223	......	2,766	74	......	......	2,989	74	3,063
Total........	151,281	67,068	329,350	116,787	522,323	63,245	125	......	1003,079	247,100	1,250,179
1881	127,756	49,413	257,573	89,395	446,649	70,203	45	......	826,003	209,011	1,035,014
1880	99,491	35,180	326,870	108,052	346,103	34,745	4,218	......	776,681	177,977	954,659
1879	71,700	18,881	255,674	75,204	243,290	19,664	4,151	......	574,905	113,719	688,624

COAL—Sales.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1882.	Year 1881.
Nova Scotia.						
Land Sales......	60,772	52,602	52,840	72,614	238,828	200,668
Sea borne......	10,148	51,471	77,988	80,517	220,124	181,745
N. Scotia.—Total..	70,920	104,073	130,828	153,131	458,952	382,413
Quebec	21,943	76,068	211,241	73,779	383,031	268,628
New Brunswick ...	22,209	37,317	47,737	46,354	153,617	123,526
Newfoundland....	2,647	10,810	29,657	36,618	79,732	62,174
P. E. Island	......	8,236	22,441	19,419	50,096	49,313
United States	1,368	15,501	45,135	37,298	99,302	113,728
West Indies	2,811	4,916	5,532	9,127	22,386	21,620
South America....	......	......	159	1,303	1,462	561
Europe	......	66	1,308	227	1,601	13,051
Total......	121,898	256,987	494,038	377,256	1,250,179	1035014
1881 ..	94,219	246,475	396,612	297,708	1,035,014	1035014
1880 ..	76,644	224,138	403,909	249,968	954,659	954,659

COAL.—General Statement.

1882.	Produce.	Sales.	Colliery Consumption.
1st Quarter...............tons	205,884	121,898	29,596
2nd Quarter............. "	323,179	256,987	25,124
3rd Quarter............. "	452,290	494,038	26,942
4th Quarter............. "	384,458	377,256	29,719
Total............	1,365,811	1,250,179	111,381
1881..................	1,124,270	1,035,114	107,888
1880..................	1,032,710	954,659	96,831
1879..................	788,271	688,624	84,787

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DEC. 31ST, 1882.

Collieries.	Seams.	Produce.	Sales.				Colliery Consumption.		
			Paying Royalty.	Free.	Total.	Per Cent.	Engines.	Workmen.	Per Cent.
Cumberland County.									
Chignecto	North Seam	12504	9600	1137	10737	86	1572	223	13
Joggins	Main	20178	16919	1477	18396	99	2352	283	13
Minudie	Minudie	200	92	83	175	87	....	....	....
Scotia	North	1049	817	208	1025	99	....	....	....
Springhill	Black, North & South	200353	123853	64163	188016	94	9442	2801	6
Styles	Styles	....	....	....	....	....	....	....	....
Pictou County.									
Acadia	Acadia	105569	67858	30287	98145	93	5742	1857	7
Albion	Third & McGregor	141090	85334	37135	122469	81	11646	3283	10
Intercolonial	Acadia	150486	107760	33639	141399	94	6339	2848	6
Vale	McBean	92808	68398	15726	84124	90	7845	3882	12
Cape Breton County.									
Blockhouse	Blockhouse	61753	57392	55	57447	93	2800	1506	6
Caledonia	Phelan	59893	45973	13323	59296	100	1393	931	4
Glace Bay	Harbor	70186	64203	4846	69049	99	2327	1334	5
Gowrie	McAuley	62256	52212	13152	65364	100	850	1067	3
International	Harbor	109286	89266	13661	102927	94	1604	1529	3
Lingan	Lingan Main	2650	42	22	64	2	1687	403	....
Ontario	Phelan	24541	22867	499	23366	95	817	555	5
Reserve	Phelan	93828	69465	4967	74432	79	2730	2366	5
Sydney Mines	Sydney Main	156758	120903	12720	133623	85	18967	8284	6
Inverness County.									
Broad Cove	....	250	118	....	118	....	....	10	....
Richmond County.									
Little River	....	173	7	....	7	....	150	6	....
		1365811	1003079	247100	1250179	....	78213	33168	....

Statement of the Number and Classes of Men employed, and average results of each Colliery, during the year ended Dec. 31st, 1882.

COLLIERIES.	UNDERGROUND.				SURFACE.				CONSTRUCTION.		TOTAL.		AVERAGE NO. OF DAYS PER PERSON.		Average No. of tons per cutter.	Average tons per day per cutter.	Average quantity raised per day, Tons.	HORSES.		PITS. WORKED
	Skilled Laborers.	Laborers.	Boys.	Days' Labor.	Mechanics.	Laborers.	Boys.	Days' Labor.	Persons.	Days' Labor.	Persons.	Days' Labor.	Under-ground.	Surface.				Above.	Below.	Days.
CUMBERLAND CO.																				
Chignecto	34	15	5	16168	11	24	4	10885	26	9781	119	36834	298	278	367	1·2	42	4	2	298
Joggins	54	9	12	21028	15	13	5	8170	29	9770	137	38968	280	287	373	1·3	70	9	5	286
Minudie	4	3	...	700	5	3	...	2050	2	25	17	2775	100	256	...	...	......	1	...	......
Scotia	4	...	...	792	2	1	1	390	......	....	8	1182	198	97	......	...	......	1	...	130
Spring Hill	172	90	62	91790	31	75	11	25396	10	2963	451	120149	283	216	1164	4·0	695	3	17	288
Styles	......	...	...	....	8	......	...	416	3	156	11	572	....	.....	......	...	......	...	...	......
PICTOU CO.																				
Acadia	88	62	20	45759	19	39	6	19882	3	187	237	65828	269	310	1200	4·4	371	6	6	284
Albion	240	49	45	62643	53	142	39	66288	6	660	574	129591	187	283	587	2·2	540	22	9	261
Intercolonial	138	67	73	73822	32	61	10	31604	9	2328	390	107754	265	306	1090	4·8	662	9	12	227
Vale	176	35	19	58487	39	42	5	27276	......	....	316	85763	254	317	521	3·0	405	3	4	229
CAPE BRETON CO.																				
Blockhouse	71	8	37	20857	24	33	5	16390	......	....	178	37247	180	264	867	5·4	389	13	23	158
Caledonia	76	9	16	21980	15	34	8	14169	2	791	160	36940	217	248	788	4·8	310	4	15	193
Glace Bay	97	16	14	21091	26	23	4	13512	......	....	180	34603	165	254	723	3·3	326	6	9	215
Gowrie	97	12	49	33579	16	44	15	18087	2	250	235	51916	212	238	641	3·1	303	6	32	205
International	135	15	48	44216	21	65	4	24945	2	606	290	69767	223	277	809	4·5	610	6	33	179
Lingan	10	1	3	1673	2	15	4	5906	......	....	35	7579	......	......	......	...	......	1	3	23
Ontario	35	3	8	9381	7	16	3	5171	......	....	72	14552	204	200	700	3·0	107	6	5	228
Reserve	118	18	30	35612	21	25	4	10813	......	....	216	46425	214	215	795	3·7	432	2	17	217
Sydney Mines	240	39	93	88697	69	103	39	60475	3	1220	586	150392	238	286	653	2·5	612	12	41	256
RICHMOND CO.																				
Little River	2	1	...	130	...	3	...	60	......	....	6	190	......	......	......	...	......	...	...	45
INVERNESS.																				
Broad Cove	......	4	1	191	2	9	1	733	......	....	17	924	......	......	......	...	......	...	2	23
Total	1791	456	535	648596	418	770	168	362618	97	28737	4235	1039951	233	267	762	3·2	......	114	235	236

COLLIERY CONSTRUCTION ACCOUNT — 1882.

COLLIERIES.	Shafts.	Slopes.	Levels.	Adits.	Machinery.	Colliery Buildings.	Surface Works.	Railways	Wharves.	Prospecting.	TOTAL.
CUMBERLAND CO.											
Chignecto	$	$9800 00	$4537 00	$	$ 10000 00	18000 00	$6650 00	$4737 00	$	$ 750 00	$ 54474 00
Joggins	375 00	4492 00			9540 00	2310 00	2180 00	6850 00			25747 00
Minudie		2500 00			8500 00	4761 00	1300 00				17061 00
Scotia											
Springhill		2133 00			16325 00	2100 00	935 27	2817 00		4226 50	28536 77
Styles		220 00	222 00		100 00	155 00	300 00			250 00	1247 00
PICTOU CO.											
Acadia					273 84	225 03					498 87
Albion					2630 51	1358 03	2545 10	621 15			7154 79
Intercolonial	4067 22		989 17		6396 27	1634 23	224 72	2347 02			15658 63
Vale					20350 00			5181 00			25531 00
CAPE BRETON CO.											
Blockhouse											
Caledonia			337 45				461 65				799 10
Glace Bay											
Gowrie	1020 00	259 00	439 00			800 00	300 00	1060 00			3878 00
International						650 00				939 63	1589 63
Lingan										453 00	453 00
Reserve	293 97	1278 75	2093 04	1119 94							4785 70
Ontario	100 00	326 34	583 40		2432 11	320 50	58 00	1354 53	324 00		5498 88
Sydney Mines						1250 40					1250 40
INVERNESS CO.											
Broad Cove											
RICHMOND CO.											
Little River											
VICTORIA CO.											
New Campbellton											
	$5856 19	21009 09	$9201 06	$1119 94	$ 76547 73	33564 19	14954 74	24967 70	$ 324 00	$6619 13	$194163 77

Nova Scotia Coal Sales from 1875 to 1882 (inclusive).

Year.	Sales.	Total.
1785	1,668	
1786	2,000	
1787 } 1788 } 1789 } 1790 }	10,681	14,349
1791	2,670	
1792	2.143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	70,452
1811	8,516	
1812	9,570	
1813	9,744	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	91,527
1821	11,388	
1822	7,512	
1823 } 1824 } 1825 }	27,000	
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	140,820

Year.	Sales.	Total.
1831	37,170	Forw'd 368,196
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145 962	
1840	101,198	839,981
1841	148,298	
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	2,399,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576.935	
1865	635.586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	4,927,339
1871	596,418	
1872	785,914	
1873	881.106	
1874	749,127	
1875	706,795	
1876	634,207	
1877	697,065	
1878	693,511	
1879	688,626	
1880	954,659	7,377,428
1881	1,035,014	
1882	1,250,179	2,285,193
	Total...	19,731,764

SUMMARY.

1785 to 1790	14,349	1831 to 1840	839,981
1791 " 1800	51,048	1841 " 1850	1,533,798
1801 " 1810	70,452	1851 " 1860	2,399,829
1811 " 1820	91.527	1861 " 1870	4,927,339
1821 " 1830	140,820	1871 " 1880	7,377,428

COAL.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	18,173	24 ad.	1867	338,492	$1.25
1851	116,274	"	1868	228,132	"
1852	87,542	"	1869	257,485	"
1853	120,764	"	1870	168,180	"
1854	139,125	Free.	1871	165,431	"
1855	103,222	"	1872	154,092	.75
1856	126,152	"	1873	264,760	"
1857	123,335	"	1874	138,335	"
1858	186,743	"	1875	89,746	"
1859	122,720	"	1876	71,634	"
1860	149,289	"	1877	118,216	"
1861	204,457	"	1878	88,495	"
1862	192,612	"	1879	51,641	"
1863	282,775	"	1880	123,423	"
1864	347,594	"	1881	113,728	"
1865	465,194	"	1882	99,302	"
1866	404,252	"			

NOTE.—The quantities given for the years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably under estimated.

GOLD.—GENERAL STATEMENT FOR THE YEAR 1882.

Showing the number of Mines at work, days' labor performed, quantities of Quartz crushed, yield of Gold, for the year ended December 31st, 1882.

DISTRICTS.	Number of Mines.	Days' Labor.	Mills Employed.	Steam Power.	Water Power.	Quartz, &c. Crushed.	Yield per Ton.			Maximum Yield per Ton.			Total Yield of Gold.			Average yield per man per day for 12 months at $18.00 per oz.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou	2	7,973	1	1	..	1,601	0	7	8	1	19	5	588	6	11	1.32
Gay's River	..	....	..	..	..	....	..	..	..	..	..	..	....	..	..	....
Montagu	2	6,044	2	2	..	586	1	3	8	3	0	21	684	9	22	2.03
Oldham	2	2,798	2	1	1	690	0	11	18	4	12	6	411	6	12	2.64
Renfrew	1	3,724	1	..	1	416	0	9	11	0	9	11	196	19	10	.94
Sherbrooke	8	24,058	6	4	2	6,251	0	8	3	4	7	0	2,542	17	14	1.90
Stormont	1	6,908	1	1	..	511	1	15	7	3	6	13	903	17	16	2.35
Tangier	3	11,001	3	2	1	1,622	0	9	17	3	14	1	789	11	16	1.29
Uniacke	3	9,128	4	3	1	3,440	0	10	12	3	0	18	1,786	4	9	3.52
Waverley	1	2,238	2	1	1	554	0	8	14	2	15	12	234	7	5	1.88
Wine Harbor	2	1,739	1	..	1	145	0	12	13	0	12	13	91	9	0	.94
Unproclaimed	5	31,273	5	2	3	5,265	1	2	7	4	8	10	5,877	14	1	3.30
	30	106,884	28	17	11	21,081	0	12	18	4	12	6	14,107	3	20	2.37

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

Month.	Caribou.							Gays' River.							Montagu.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Ozs.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.
January	4	960	38	311	41	9	12	..	....	..	..	....	....	....	2	730	30	87	155	11	0
February	4	838	33	92	111	8	12	..	....	..	..	....	....	....	2	667	26	30	26	15	6
March	2	266	11	76	17	4	..	..	....	..	..	....	....	....	2	626	25	38	49	0	7
April	3	640	25	46	10	16	..	..	....	..	..	....	....	....	2	729	30	70	111	3	15
May	3	748	30	32	25	17	..	..	....	..	..	....	....	....	3	949	34	66	94	7	0
June	2	509	20	102	71	7	19	..	....	..	..	....	....	....	3	629	25	88	77	4	9
July	3	652	26	134	38	19	20	..	....	..	..	....	....	....	2	423	17	108	34	13	11
August	2	597	25	151	22	18	11	..	....	..	..	....	....	....	2	521	21	22	31	13	16
September	3	588	25	8	3	17	1	..	....	..	..	....	....	....	1	273	12	18	29	9	6
October	2	456	18	147	26	15	11	..	....	..	..	....	....	....	1	...	..	42	54	6	0
November	2	920	36	216	85	10	18	..	....	..	..	....	....	....	1	232	9	17	20	6	0
December	1	799	32	286	132	2	3	..	....	..	..	....	....	....	1	265	10	..	..	..	..
	2	7973	....	1601	588	6	11	..	....	..	..	....	....	....	2	6044	....	586	684	9	22

MONTHLY STATEMENT FROM EACH GOLD DISTRICT (CONTINUED).

NAME.	Oldham.							Renfrew.							Sherbrooke.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.
January	2	200	8	50	36	12	1	1	236	10	88	21	10	0	7	2132	90	208	159	15	0
February	.	...	..	..	...	...	...	1	200	8	43	38	0	0	7	1728	69	550	205	6	0
March	.	...	..	15	8	10	10	1	315	14	...	..	...	...	7	1917	76	212	187	3	0
April	2	300	12	25	10	0	16	1	224	9	48	26	10	0	5	682	27	185	142	19	0
May	2	205	8	6	6	11	0	2	389	15	35	21	6	10	8	1049	42	313	108	5	0
June	2	360	14	59	115	8	20	2	655	26	86	31	10	0	9	1862	74	489	120	1	0
July	2	423	17	108	34	13	11	2	690	28	46	36	3	0	9	1820	72	612	220	2	0
August	2	312	12	109	47	4	13	2	571	23	70	22	0	0	10	2430	100	617	257	7	0
September	2	134	6	133	50	5	13	2	444	17	...	...	...	...	10	2482	100	760	238	9	0
October	2	259	10	147	56	0	0	.	....	..	...	...	...	...	7	2366	94	467	142	1	2
November	2	269	11	38	46	0	0	.	....	..	...	...	...	...	10	2678	107	959	391	4	0
December	2	336	13	...	...	...	...	.	....	..	...	...	...	...	19	2912	111	879	370	5	12
	2	2798	....	690	411	6	12	1	3724	....	416	196	19	10	8	24058	....	6251	2542	17	14

MONTHLY STATEMENT EROM EACH GOLD DISTRICT.—(CONTINUED).

MONTH.	Stormont.							Tangier.							Uniacke.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwts.	Grns.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwts.	Grns.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwts.	Grns.
January	..	....	....	....	....	....	....	3	520	21	162	103	11	12	3	794	32	327	114	5	6
February	..	....	....	....	....	....	....	2	348	14	....	..	..	..	3	617	24	157	62	5	6
March	..	....	....	....	....	....	....	1	394	16	42	68	9	9	3	625	25	196	103	1	4
April	..	....	....	51	149	13	0	3	653	26	243	170	1	18	5	448	17	203	189	0	1
May	1	640	25	75	81	5	0	3	557	22	200	77	17	18	4	1,143	46	366	266	7	0
June	1	832	33	84	144	0	0	2	386	16	49	15	6	16	6	1,004	40	507	283	2	6
July	1	950	38	76	110	0	0	3	983	39	175	60	3	11	3	1,109	45	180	100	4	12
August	1	1,109	44	71	136	1	4	3	1125	45	....	...	..	..	3	716	28	268	93	2	11
September	1	1,200	48	....	....	....	....	2	1251	50	150	3	11	4	3	738	33	415	233	16	0
October	1	822	33	....	....	....	....	3	1432	53	40	14	0	0	3	543	21	208	155	3	0
November	1	925	37	116	196	19	12	3	1817	72	185	110	0	0	3	661	26	199	73	11	11
December	1	430	17	38	85	19	0	3	1535	61	376	166	10	0	3	730	30	414	112	6	0
	1	6,908	....	511	903	17	16	3	11001	....	1622	789	11	16	3	9,128	....	3440	1786	4	9

MONTHLY STATEMENT FROM EACH GOLD DISTRICT. — (CONTINUED.)

MONTH.	WAVERLEY.							WINE HARBOR.							UNPROCLAIMED.						
	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	Men.	Tons.	Oz.	Dwt.	Grs.
January	2	752	30	109	21	4	0	2	532	21	..	...	...	....	4	2821	110	450	542	16	4
February	3	711	29	237	55	19	0	2	253	10	45	33	0	0	4	2179	87	426	494	10	0
March	2	100	4	9	12	1	0	2	169	7	..	..	...	...	4	2214	89	465	494	12	18
April	1	40	2	8	26	16	0	2	532	21	10	4	6	0	4	2771	110	440	450	5	20
May	1	20	1	29	7	15	0	2	253	10	80	49	14	0	4	2793	112	467	474	15	15
June	1	30	2	19	12	9	0	.	....	..	10	4	9	0	4	2724	109	456	493	2	4
July	1	50	2	36	19	8	0	.	....	..	..	...	...	...	9	2123	85	324	309	10	15
August	1	120	5	29	39	14	0	.	....	..	..	...	...	...	5	3000	120	391	481	0	19
September	1	200	8	39	16	1	0	.	....	..	..	...	...	...	7	3500	140	966	1045	2	19
October	2	105	4	9	17	10	0	.	....	..	..	...	...	...	5	2483	99	443	554	3	7
November	2	76	3	25	3	10	0	.	....	..	..	...	...	...	6	2301	92	111	172	3	0
December	2	34	2	5	2	0	5	.	....	..	..	...	...	...	6	2364	94	326	365	11	0
	1	2238	....	554	234	7	5	2	1739	....	145	91	9	0	5	31273	....	5265	5877	14	1

GOLD.

GENERAL ANNUAL SUMMARY.

YEAR.	Total ounces of Gold Extracted.			Stuff Crushed.	Yield per Ton of 2,000 lbs.			Total Days' Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A day.	A year.
1862	7,275			6,473	1	2	11	156,000	$ 83	$249
1863	14,001	14	17	17,002		16	11	273,624	92	276
1864	20,022	18	13	21,434		18	16	252,720	1 42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2 15	645
1866	25,204	13	2	32,161		15	2	211,796	2 14	642
1867	27,314	11	11	31,386		17	9	218,894	2 24	672
1868	20,541	6	10	32,262		12	17	241,462	1 53	459
1869	17,868	0	19	35,147		10	4	210,938	1 52	456
1870	19,866	5	5	30,829		12	21	173,680	2 05	615
1871	19,227	7	4	30,791		12	11	162,992	2 12	636
1872	13,094	17	6	17,093		15	7	112,476	2 09	627
1873	11,852	7	19	17,708		13	9	93,570	2 28	684
1874	9,140	13	9	13,844		13	5	77,246	2 12	636
1875	11,208	14	19	14,810		15	4	91,698	2 20	660
1876	12,038	13	18	15,490		15	13	111,304	1 94	582
1877	16,882	6	1	17,369		19	10	123,565	2 46	738
1878	12,577	1	22	17,990		13	23	110,422	2 05	615
1879	13,801	8	10	15,936		17	8	92,002	2 34	702
1880	13,234	0	4	14,037		18	20	103,826	2 18	54
1881	10,756	13	2	16,556		12	20	126,308	1 52	456
1882	14,107	3	20	22,081		12	18	106,884	2 37	711
Total	335470	3	3	444,822	....			3264373	....	......

MINERALS OTHER THAN THOSE LEASED FROM THE CROWN.

Gypsum Exports—Ton of 2,000 lbs.

Windsor.................	Tons.	93,273	Value......	$92,697
Cheverie.................	"	29,015	"	19,170
Hantsport..............	"	5,078	"	4,614
Walton..................	"	4,980	"	3,509
Baddeck............. ...	"	1,080	"	1,000
Total...........	"	133,426	....	$120,990

Building Stone.

Antigonish..............	Tons.	14	Value......$	56
Pictou	"	583	"	3,041
Wallace................	"	5,500	"	14,000
Pugwash..............	"	260	"	1,437
Total..........	"	4,357		$18,534

Grindstones, Etc.

Messrs. A. Seaman & Co., Lower Cove, Cumberland Co.

2,400 tons Grindstones	Value......	$28,800
3,500 boxes Scythestones..................	"	3,500
		$32,300
50 tons Grindstones, Windsor................	Value......$	50

Moulding Sand.

Windsor................	Tons	400	Value......$	600

IRON MINING.

Londonderry:	39,135	tons
Guysboro	3,000	"
Total	42,135	"

AVERAGE FORCE EMPLOYED DAILY.

Belowground,	Miners	75	Days worked	16,717
	Laborers	72	"	15,288
Aboveground	Mechanics	16	"	4,012
"	Laborers	43	"	8,292
	Total	206	"	44,309

Fluxes—Ankerite	Tons.	4,584
" Limestone	"	12,000
Total		16,584

MANGANESE.*

	Tons.	Average No. persons employed.
Tenny Cape	120	
Walton	6	22
Cheverie	21	
Valley	6	
Loch Lomond	56	5
Total	205	

*Note.—These mines do not work continuously.

STATEMENT of Coal (in tons) received at the following Stations on the Intercolonial Railway from Mines in Nova Scotia, for the year ending 31st December, 1881, and for the year ending 31st December, 1882.

STATIONS.	QUANTITY.		STATIONS.	QUANTITY.	
	1881.	1882.		1881.	1882.
Halifax......	49,629	58,039	Salisbury....	779	1,896
Bedford.....	438	469	Petitcodiac....	198	248
Windsor Junc.	4,252	5,614	Penobsquis....	932	1,403
Wellington....	76	62	Anagance....	6	......
Enfield......	448	439	Sussex......	616	548
Elmsdale.....	106	182	Apohaqui....	44	37
Milford......	70	70	Norton......	18	29
Shubenacadie.	366	391	Bloomfield...	....	12
Stewiacke....	184	281	Passekeag....	38	22
Brookfield...	60	66	Hamilton....	580	979
Truro.......	4,726	6,114	Nauwigewauk	6	......
Valley......	22	12	Rothesay.....	177	343
Riversdale...	....	10	Cold Brook..	1,378	2,486
West River....	28	18	St. John.....	8,938	19,997
Hopewell....	120	576	Berry's Mills..	6	8
Stellarton....	7,538	6	Welsford....	32	41
New Glasgow..	4,896	9,974	Kent Junct'n.	......	27
Pictou Land'g.	58,931	63,160	Carleton.....	6	......
Belmont......	12	22	Chatham.....	641	942
DeBert......	46	36	Newcastle....	162	428
Londonderry.	64,466	70,082	Bathurst....	40	118
Wentworth....	42	49	Jacquet River	......	8
Greenville.....	54	48	New Mills...	12	12
Thomson......	44	30	Charlo.......	12	16
Oxford.......	258	478	Dalhousie.....	......	58
River Philip..	22	18	Campbellton..	136	171
Athol.......	12	8	Little Metis..	......	33
Maccan......	12	48	St. Flavie....	10	15
Nappan.......	....	122	Rimouski....	78	359
Amherst......	3,127	3,379	Trois Pistoles..	......	39
Aulac........	251	252	Isle Verte....	......	11
Sackville......	1,170	1,961	Riv. DuLoup..	32	26
Dorchester....	4,501	24,571	St. Thomas..	......	23
Memramcook..	138	154	St. Charles....	20	21
Painsec......	12	4	Chaudiere....	30,629	34,426
Shediac......	180	348	Point Levi....	......	663
PointDuChene	68	106	Flag Stations..	42	......
Moncton......	9,457	12,227	....	....	......
				278,230	324,871

INTERCOLONIAL RAILWAY.

STATEMENT, *giving the quantities (in tons) of the different kinds of Coal, received from the various Mines for the use of the Intercolonial Railway during the year 1881.*

MONTHS.	ACADIA.	ALBION.			VALE.	SPRING HILL.
		Round.	Small.	Coke.		
January	16		108		1360	6965
February			32		2095	6984
March			26	10	3113	6945
April		21	21		1965	6431
May			48	10	646	6605
June			53		1545	4329
July	10		121		1163	4304
August			101	10	1546	5755
September			55	10	1184	3918
October	36	119	117		2495	5868
November	19	53	115		1320	7215
December		199	121	10	2183	8263
	81	392	928	50	20615	73582

(Sg'd) T. V. COOKE,
General Storekeeper.

GENERAL STOREKEEPER'S OFFICE,
Moncton, N. B., Feb. 6, 1882.

INTERCOLONIAL RAILWAY.

STATEMENT *showing the quantities (in tons) of the different kinds of Coal received from the various Mines for the use of the Intercolonial Railway during the year 1882.*

MONTHS.	ACADIA.	ALBION.			DRUMMOND.	VALE.	SPRING HILL.		CUMB. MIN'G CO.
		Round.	Small.	Coke.			Round.	Small.	
January		262	11			2313	8587		
February	79				66	825	6339		5
March	57	16	39	10	108	3010	8702		11
April	81	262	22		254	2826	7595	12	137
May	16		44		96	3363	9041		59
June		27	12	11		1055	8258		
July	37	1381	100			252	7379		
August	56	1464	201		15	285	8934		
September	34	1200	103				9320	56	
October		1615	111			168	7525	28	
November	17	1829	161	11	17	501	6837	15	17
December		2718	92		82	2028	8926	71	
	376	10774	896	32	638	16626	97443	182	229

T. V. COOKE,
General Storekeeper.

GENERAL STOREKEEPER'S OFFICE,
Moncton, N. B., Jan. 30, 1883.

From the following Stations:—

STATION.	QUANTITY.	
	1881.	1882.
Spring Hill	69246	84070
Stellarton	77799	108570
Drummond	69697	64258
Albion	808	20
New Glasgow	58354	58073
Maccan	2326	9880
Total	278230	324871

E. & O. E.

J. J. WALLACE,
Traffic Auditor.

MONCTON, N. B., 27th Jan. 1883.

FINANCIAL STATEMENT — GOLD.

Mines Department for Twelve Months ended December 31st, 1882.

DISTRICTS.	RECEIPTS. Rents.	Royalty.	TOTALS.	EXPENDITURE. Return Rents.	Return Royalty.	Royalty Commiss'n.	Salaries and Surveys.	TOTALS.
Caribou	270 00	305 07	575 07	......	......	17 60	......	17 60
Fifteen Mile Stream	290 00	2 91	292 91	546 00	......	......	......	546 00
Gay's River	38 00	......	38 00	......	......	......	5 00	5 00
Lawrencetown	48 00	5 45	53 45	......	......	......	......	......
Montagu	24 00	137 56	161 56	......	......	8 50	......	8 50
Oldham	336 00	188 54	524 54	......	......	5 09	26 00	31 09
Ovens	30 00	......	30 00	......	......	......	......	......
Renfrew	28 00	102 22	130 22	......	......	5 40	34 00	39 40
Sherbrooke	42 00	856 04	898 04	......	......	39 82	399 98	439 80
Stormont	202 00	181 27	383 27	......	......	......	34 00	34 00
Tangier	951 00	66 31	1,017 31	46 00	......	6 02	301 29	353 31
Uniacke	20 00	278 14	298 14	......	......	21 47	130 00	151 47
Wagamatkook	14 00	2 88	16 88	......	......	......	......	......
Waverley	12 00	104 20	116 20	630 00	20 81	8 27	57 50	716 58
Wine Harbor	4 00	49 85	53 85	......	......	......	......	......
Unproclaimed	14,48 00	336 97	1,784 97	204 00	333 36	......	609 25	1,146 61
Prospecting Licenses	....	......	4,921 82	......	......	......	......	*84 98
	$3,757 00	2,617 41	$11,296 23	$1,426 00	354 17	112 17	1,597 02	$3,574 34

* Return.

OTHER THAN GOLD.

Mines Department, for twelve months ended Dec. 31st, 1882.

COUNTIES.	RECEIPTS.				EXPENDITURE.	
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Return Licenses to Search.	Totals.
Annapolis	$ 120 00	$	$	$ 120 00	$	$ ....
Antigonish	360 00	....	....	360 00	....	....
Cape Breton	860 00	575 00	48882 56	50317 56	60 00	60 00
Colchester	420 00	150 00	....	570 00	20 00	20 00
Cumberland	900 00	300 00	19330 47	20530 47	20 00	20 00
Digby	160 00	....	....	160 00	....	....
Guysborough	200 00	100 00	....	300 00	40 00	40 00
Halifax	......	....	....	....	40 00	40 00
Hants	140 00	....	....	140 00	40 00	40 00
Inverness	400 00	50 00	....	450 00	100 00	100 00
Kings	20 00	....	....	20 00	....	....
Pictou	880 00	700 00	21010 08	22590 08	20 00	20 00
Richmond	240 00	50 00	....	290 00	....	....
Victoria	380 00	....	1225 17	1605 17	20 00	20 00
Yarmouth	100 00	....	....	100 00	 00	....
Examinations	......	....	....	60 00	 00	112 13
	$ 5180 00	$ 1925 00	$ 90448 28	$ 97613 28	$ 360 00	$ 472 13

ABSTRACT ACCOUNT.

Receipts and Expenditure for the Twelve Months ended 31st December, 1882.

RECEIPTS.

Licenses to search	$ 5,180.00	
" " work	1,925.00	
Royalty	90,448.28	
Examinations	60.00	
		$97,613.28
Rents	3,757.00	
Royalty	2,617.41	
Prospecting Licenses	4,921.82	
		11,296.23
		$108,809.51

EXPENDITURE.

Return Licenses to Search	$ 360.00	
Examinations	112.13	
		$ 472.13
Return Rents	1,426.00	
Royalty	354.17	
Royalty Commission	112.17	
Salaries and Surveys	1,597.02	
Return Prospecting Licenses	84.98	
		3,574.34
General Expenses	5,803.29	
Postage	69.53	
Stationery and Printing	410.05	
		6,282.87
		$10,329.34

REPORT

OF THE

DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1884.

HALIFAX, N. S.
COMMISSIONER OF PUBLIC WORKS AND MINES,
QUEEN'S PRINTER.
1885.

CONTENTS.

DEPARTMENT OF MINES.

REPORT FOR THE YEAR 1884.

To His Honor Matthew H. Richey, Esq., Lieutenant-Governor of the Province of Nova Scotia, &c., &c., &c.

May it please Your Honor,—

I respectfully present herewith to Your Honor the Annual Report of the Inspector of Mines, together with statistical information, compiled by him from official and other returns made to the Department of Mines during the year 1884.

I remain

Your Honor's obedt. servant,

CHARLES E. CHURCH,

Commissioner of Public Works and Mines.

Halifax, February 16, 1885.

REPORT

ON THE

MINES OF NOVA SCOTIA,

BY EDWIN GILPIN, JR., A.M., F.G.S., F.R.S.C.,

INSPECTOR OF MINES.

(Member of the North of England Institute of Mining Engineers.)

OFFICE OF INSPECTOR OF MINES,

HALIFAX, February 16, 1885.

TO THE HONORABLE

CHARLES E. CHURCH, M. P. P., M. E. C.,

Commissioner of Public Works and Mines:

SIR,—I beg leave to submit the following report on the Mines of Nova Scotia during the year 1884.

The following summary shows, so far as I have been able to learn, the mineral production of Nova Scotia during the year 1884, compared with that of the previous year:

		1883.	1884.
Gold	Ounces	15,446	16,079
Iron Ore	Tons	52,410	54,885
Manganese Ore	"	150	302
Copper "	"	60	110
Lead "	"		100
Antimony "	"		600
Coal raised	"	1,422,553	1,389,295
*Gypsum	"	144,668	111,068
*Building Stone	"	181	780
Coke made	"	44,189	40,085
Limestone	"	26,477	25,567
*Grindstones, etc	"	155	2,200

* Amounts exported, Home Consumption unknown.

Through the kindness of the Collectors of Customs at the various ports of the Province I am enabled to give further details under this head at the end of the report.

In addition to a detailed notice of the operations at each mine, and the usual statistical tables, I submit a summary of the minerals exported, not paying royalty to your honorable Government.

I also beg leave to enclose the reports of W. Madden, Jr., Esq., Deputy Inspector of Mines for the District of Cumberland, Colchester and Pictou Counties; and of Patrick Neville, Esq., Deputy Inspector of Mines for the Island of Cape Breton.

These gentlemen have been occupied in paying regular visits to the mines in their respective districts, and in making enquiries into accidents, complaints, etc. With regard to ventilation, one of the most important points in connection the working of coal mines, I would here remark that in Nova Scotia proper it is produced in most of the mines by fans, and generally is sufficient in quantity and properly circulated. In Cape Breton, fans are in operation only at two collieries, the rest are ventilated by furnaces, which are not adapted for the shallow mines of the Island. When the Cape Breton collieries were first opened their furnaces provided sufficient air, but now that the workings are greatly extended the results are not equally satisfactory.

At the Spring Hill and Victoria collieries mechanical ventilators of an inexpensive and efficient character have given good results; and the introduction of fans of the same type, or of the Guibal pattern, as at the Sydney mines, would be found beneficial in the other Cape Breton collieries. In several cases during the past season Mr. Neville found that this highly important matter had been seriously neglected. It was immediately put right on his drawing attention to it; but it is not the intention of the law that a coal mine should be operated with imperfect ventilation until an official inspection is made. The responsibility of maintaining a proper and sufficient amount of air rests on the management. I have instructed Mr. Neville in future to report any such violation of the ventilation clauses of the Act, with a view to having the law at once enforced.

After the close of the meeting of the British Association for the advancement of Science, at Montreal, a party of the members visited this Province on the invitation of your honorable Government. They saw various points of interest, including the Cumberland Coal Field, the Londonderry Iron Mines, the Gypsum deposits, and the Gold Mines at Montagu. It is to be regretted that the time at their disposal did not permit of their trip being extended to Pictou and Cape Breton, but they were very much pleased with what they saw, and the favorable impressions they carried away with them will not fail to prove of benefit to the Province.

COAL TRADE.

The total sales for the year 1884 amounted to 1,261,650 tons, made up of 945,518 tons of round and 316,132 tons of slack coal, as compared with 1,297,523 tons during the year 1883, comprising 1,016,418 tons of round and 281,105 tons of slack coal. This would show a decrease of 70,900 tons in the round coal sales, and an increase of 35,027 tons in the slack coal sales; making a total decrease of 35,873 tons.

The increase in the sale of slack coal (which does not pay royalty) is worthy of notice, and the following table will show that its value for economic purposes is being appreciated :

Total sales of slack coal, year	1884	316,132 tons.
"	1883	281,105 "
"	1882	247,100 "
"	1881	209,011 "
"	1880	177,977 "
"	1879	113,719 "
"	1878	131,528 "
"	1877	109,155 "

At present about 85,000 tons of the slack are burned into coke. The following are the principal customers using slack for other purposes during the past year:

United States	51,519 tons.
Quebec	46,353 "
New Brunswick	38,061 "
P. E. Island	27,532 "
Nova Scotia	75,000 "

This grade of coal now forms the bulk of our exports of fuel to the United States ; and I believe it is used there chiefly for mixing with anthracite smalls for boiler furnaces. Most of that sold in the Dominion is for steam raising in stationary boilers, and some, especially in Prince Edward Island, for lime burning. It is in many cases an excellent fuel for raising steam, and its introduction at the boilers of our collieries has given results equal to that of round coal, at a diminished cost.

The following are the most noticeable points in the coal trade:

The home sales were 493,050 tons compared with 471,327 tons in 1883, and 458,592 tons in 1882.

The Province of Quebec took 396,782 tons against 410,605 tons during the preceding year.

The sales to New Brunswick were 158,420 tons, a decrease of 9,320 tons.

Newfoundland took 86,216 tons as compared with 61,678 tons during the preceding year.

The sales to Prince Edward Island show an increase of 2,311 tons being 50,399 tons.

The West India sales have decreased from 31,860 tons in 1883 to 9,595 tons during the past year.

The sales to the United States were 64,515 tons (of which only 12,996 tons were round coal), the smallest recorded since the year 1850, except during 1879, when they were 51,641 tons.

CUMBERLAND COUNTY.

The total sales of this county amounted to 258,405 tons against 222,347 tons in 1883. This increase is due to the greatly augmented output of the Spring Hill Mines; the Chignecto colliery having fallen off in its production.

The home sales were 59,502 tons against 43,731 tons during the preceding year.

The sales to New Brunswick were 93,724 tons against 127,751 tons in 1883.

The province of Quebec took 104,243 as compared with 46,483 tons in 1883, and 58,561 tons in 1882.

COLLIERIES.

Boston Coal Mining Company.—In the beginning of the year a few tons of coal were taken from this colliery for local sales.

Chignecto.—During the past year, the second set of balances were worked, and the east levels extended. On the west side work was discontinued after the second balance was finished. A dip slant was started near the bottom on a south-west course, and driven down several hundred feet and bords broken off. The mine was idle during great part of the season, and in the fall a few men were put in to take out coal for country sale. The out put was 11,644 tons against 23,395 tons raised during the previous year.

Joggins.—The operations at this mine have been confined to the new slope, which is fully opened out. A small furnace has been put up. The rotary screen at this colliery has continued to work well, and the nut coal is said to find favor in the market. Shortly before the close of the year the colliery office was burnt down, and the pit plan destroyed. The benefit of the sections of the Act which require

duplicates of colliery plans was well shown, for the department have been enabled to furnish them with a plan for temporary use. The out put was 25,034 tons against 26,098 tons during the preceding year.

Milner.—During the past season Mr. John Hurley has taken out a few tons of coal for local sales.

Minudie.—Work has been steadily carried on at this Mine during the past season. The coal is of good quality and mined by the long wall system in fair sizes. In the fall work was interrupted for a short time through the roof closing the air way, but the stoppage was not of any moment. The output was 10,023 tons against 4,451 tons in 1883.

Maccan.—Mr. William Patrick opened the seams formerly worked on the Lawson area, on a property adjoining to the west. A pit was sunk on a seam about two feet thick, of good quality; and a slope driven down 75 feet on another overlying seam of about the same thickness. These beds are separated by about 130 feet of strata, and dip S. 45° E. at an angle of about 30°. Heapsteads and houses have been built, and a syphon put in to drain the slope. The coal resembles that opened at the Lawrence Colliery on the River Hebert, and is of good quality, and in demand for local sales. The returns show that 94 tons were raised.

Spring Hill.—The operations at this extensive colliery have been pushed with vigor, and the output again shows an increase, being 232,481 tons against 193,151 tons in 1883. The sinking on the new seam has been continued. A fan has been put up at the west slope, and works on the "blow down" principle. Arrangements have been made to concentrate the pumping plant at the west slope, where a pair of Allison pumps, having 30 inch steam and 14 inch water cylinders, will raise the water from the east, west and north mines through 12 inch wrought iron columns.

The coking qualities of the coal in the newer openings at these mines have been found satisfactory, and a considerable tonnage has been coked at Londonderry for the blast furnaces.

Salt Springs.—Mr. Pitblado and others opened a seam of coal near the Salt Springs Station, five miles east of Spring Hill Junction. The seam is about three feet thick, and is apparently of fair quality, as shown by the following analysis:—

	Slow Coking.	Fast Coking.
Moisture	1.47	1.47
Volatile combustible matter	33.46	34.70
Fixed carbon	55.87	54.63
Ash	9.20	9.20
	100.00	100.00
Sulphur	.79	.79

It is not possible to say at present if this seam and those found in its immediate vicinity can be identified with any of those worked at Spring Hill; but operations here may throw some light on the structure of the eastern end of the Cumberland coal field.

Scotia.—Operations were continued at this mine on the usual scale. In the spring Mr. George Wilson sunk a new slope, 95 feet deep, to the westward of the old mine, referred to in my last report, leaving a barrier. Later on this barrier was broken through, and as the fire appeared to have died out some pillars were taken from the old mine. The returns show a production of 609 tons.

PICTOU COUNTY.

The total sales were 464,181 tons compared with 461,809 tons in 1883.

The home sales were 262,780 tons against 260,980 tons during the preceding year.

The sales to Quebec were 139,934 tons against 145,527 tons in 1883.

New Brunswick took 25,233 tons against 7,402 tons in 1883.

Prince Edward Island took 31,343 tons compared with 38,622 tons during 1883, and 41,463 tons during 1882.

COLLIERIES.

Acadia.—The regular operations at this colliery present no new features of interest. The new lift is being successfully worked, the slope haulage being now about 2,350 feet. Preparations are being made to replace the present pump by one larger and better adapted to meet the extension of the workings. The output of the colliery was 115,451 tons against 115,028 tons in 1883.

Albion Mines.—The output from these collieries was 201,557 tons compared with 168,231 tons during the preceding year. The fan formerly at the Foord pit was removed to the McGregor workings, and should provide ample ventilation for some time to come. Two boilers have been put up to drive it. The workings in the third seam have been regularily carried on. There were 25,681 tons of coke made during the year.

Intercolonial.—During the past year a compound 180 horse power engine was placed in the 1,700 feet level to assist the main haulage engine. Two Lancashire boilers were put up to increase the steam power, and the boilers housed in with an iron roof. In March the lamp house was burned, and all the safety lamps destroyed. A new fire proof house has been erected in its place. The main slopes were extended and the new lift is fairly under way.

The No. 4 slope and the pit in the second seam were not utilized during the summer. The out put wås 120,656 tons as compared with 147,111 tons in 1883.

Vale.—During the past season the extraction of the pillars in the 1800 foot level of the McBean seam has been carried on successfully. The slope is being extended 700 feet for a new lift. The coal continues to be of good quality and to preserve its thickness. The slope has been re-timbered, and the track lowered.

In the Greener seam the slope has been extended to a distance of about 1000 feet, and levels turned away. The coal has thickened to seven feet, and is stated to be of very good quality, and will prove an important addition to the coal resources of the county. The branch from the company's railway to the mouth of the slope is ready foı rail laying, and it is expected that the mine will be in fıll operation in the spring. The out put was 73,529 tons, against 74,656 tons in 1883.

During the spring Mr. John McNeil did a little work on the Kirby and Merigomish areas.

Mr. A. McG. Barton prospected his coal property lying to the south and west of the Vale area, and traced some of the Vale seams over a large portion of it. His work is considered to have shown the presence of a seam, hitherto unknown, lying above the six feet or Greener seam now being opened on the Vale area.

CAPE BRETON COUNTY.

The total sales during the past year from Cape Breton County were 539,064 tons compared with 612,614 tons in 1883.

The home sales showed a slight increase, being 179,768 tons against 166,262 tons during the preceding year.

New Brunswick took 39,463 tons, an increase of about 7,000 tons over the sales of the preceding year.

The Newfoundland sales were 83,143 tons against 58,342 tons sent there during 1883.

Prince Edward Island took 19,056 tons, nearly double the amount sold there during the preceding year.

The sales to Quebec were 152,605 tons against 218,595 tons in 1883, and 198,892 tons in 1882.

The sales to the West Indies show a falling off of 21,872 tons, being only 8,909 tons.

The sales to the United States were 62,565 tons against 93,433 tons during the previous year.

The sales to other points were inconsiderable.

COLLIERIES.

Sydney.—The workings at this colliery have been regularly extended in pursuance of the plans laid down at their start. The system of electrical signaling between the engine house and the pit bottom has been found to work satisfactorily. Near the top of the north slant an automatic switch has been found useful, and could in some cases be advantageously copied. The full boxes coming up close it, and it re-opens, so that if the rake breaks away at the bank head it will pass into a short blind slant. When the empty rake is going down, the switch is kept closed by the bank head man until it has passed. The returns show that 149,378 tons of coal were raised, against 162,866 tons during the preceding year. There were 81 tons of coke made.

Victoria.—The work of opening out this mine has been satisfactorily carried on. The railway has been re-ballasted and laid with 50 lb. steel rails, and substantial stone culverts have been put in. The new pier is arranged to have gravity tracks for both full and empty cars. There is a depth of 30 feet of water at the end of the pier, and it is arranged that three steamers can be bunkered at the same time. There have been 14,112 tons of coal raised.

Barasois.—A slope has been started about 2½ miles from the Low Point Mine, on a seam considered to be the extension of the Lingan coal. The seam dips N. 30° E. at an angle of 16°, and presents 6 feet of clean bright coal. It is proposed in the spring to open out and complete the winning, and to extend the railway from the Low Point Colliery to enable this mine to ship at the South Bar.

Lingan.—At this mine work has been confined principally to the low lift in the sea area. Here the coal presents the following section:—

	Ft.	In.
Top coal roof	1	3
Coal	1	8
Band	0	5
Coal	5	6
Coal		8
	9	6

The levels have been driven in about 20 chains and rooms broken off. The workings in the sea area are very dry, and a portable plunger pump readily removes all the water. All the available pillars in the No. 4 level were taken out. The out-put was 23,404 tons compared with 16,482 tons during the year 1883.

Reserve.—During the past season this colliery raised 96,114 tons, against 110,456 tons in 1883. The workings have been extended from both slopes. At the request of adjoining proprietors a survey was made of the main slope and bottom level by Mr. H. R. McKenzie,

C. E., and the accuracy of the pit plans confirmed. At a point 14 chains down the slope a dip slope has been started to cut the Emery seam, and it is expected that it will soon reach it. Wooden water pipes have been successfully used for pump columns in this mine, and their cheapness should recommend their adoption for short lifts.

International.—The working faces at this mine have been extended on their usual course. The coal is now weighed at the bank head as it is raised. The introduction of an underground locomotive on the new engine road, and the adoption of some form of mechanical venti-tion, are being considered. The out-put was 87,216 tons as compared with 99,018 tons during the year 1883.

Little Glace Bay.—A few tons of coal were taken from the Hub seam during the past season. Operations in the Sterling pit have been continued as usual in the rise coal. The proposed concentration of the shipping of this colliery and of the Caledonia Mines at the Glace Bay Harbor has been carried out, and I believe works well. The out-put was 36,138 tons against 75,848 tons during the preceding year.

Bridgeport.—During the summer Mr. Henry Mitchell re-opened the workings of the General Mining Association on their area on the south side of Lingan Basin. The following history of this mine, taken from Mr. Brown's work on the Coal Fields of Cape Breton, will be of interest.

The mine was first opened in 1830 by a level driven from the shore along the outcrop of the seam now known as the Phalen. Pits were sunk at intervals of about a quarter of a mile, and the coal was raised by horse gins. At the face of the cliff the seam presented the following section:—

	Ft.	In.
Coal	3	0
Shale	0	5
Coal	5	3
	8	8

As the workings were advanced from the shore the shale increased to a thickness of twenty-eight feet at a distance of half a mile. Beyond this point it thinned rapidly, and at the Last pit, now being worked, the coal bed shows as follows:—

	Ft.	In.
Coal	3	0
Stone	9	0
Coal	6	0

A bore hole put down about 300 yards to the dip of the level showed the shale to be only fourteen inches thick. (In the Reserve Mine, working the same seam, a short distance to the south, the stone parting is of insignificant thickness.)

At first the coal was lightered out to vessels anchored in the open bay, but in 1833 a railway was built along the sand bar to Lingan Harbor. The Bridgeport is a good domestic fuel, and valuable as a gas coal, yielding nearly 10,000 cubic feet of gas per ton.

Mr. Mitchell has connected his pit with the International Company's railway, put up houses, etc., and shipped 3,115 tons of coal. The coal looks well, and is apparently similar to the Reserve coal, the qualities of which are well known. Mr. Brown estimates that the property contains 12,600,000 tons of coal in the Phalen seam, of which amount the General Mining Association extracted about 175,000 tons.

Caledonia.—During the past season the railway to the Glace Bay Harbor was completed, and three shoots built. The old railway to Port Caledonia has been dismantled. The extraction of pillars has been successfully continued in the rise coal. The out-put was 69,461 tons against 51,500 tons in 1883.

Ontario.—In the summer enough water was taken out to permit work being carried on in the second lift by Messrs. J. and J. J. McDonald. The out-put was 5,890 tons.

Block House.—During the summer a good deal of coal was taken from the deeps, the out-put being 23,668 tons. Operations were confined to the pillars, and present no new features of interest.

Gowrie.—Work has been carried on vigorously at this mine during the past season. The main levels have been continued, and rooms broken off. The out-put was 89,384 tons against 73,290 tons in 1883.

At the instance of parties owning an adjoining area a survey was made by Mr. McKenzie to see if any trespass had been made. The result of the survey confirmed the accuracy of the pit plans.

MISCELLANEOUS.

Some more prospecting work was done on the "Anthracite" coal at McAdam's Lake, near Sydney.

At Beech Hill, near the Renfrew Gold Mines, some work was done on a small seam of coal of an anthracitic character.

Discoveries of coal were reported at Upper Economy, and at Oxford Station on the Intercolonial Railway.

No work was done at the McBert Mine beyond a little prospecting. The coal opened in 1883 by a slope, as referred to in my last report, would appear from the following analysis, made by me, to be of fair quality:—

	Fast Coking.
Hygroscopic moisture	1.594
Volatile combustible matter	33.188
Fixed carbon	58.206
Ash	7.012
	100.00
Sulphur	2.648

DEPUTY INSPECTORS' REPORTS.

DISTRICT OF PICTOU, COLCHESTER AND CUMBERLAND.

WESTVILLE, PICTOU CO.
Dec. 31st, 1884.

E. GILPIN, ESQ.,
Inspector of Mines:

DEAR SIR,—I beg leave herewith to submit the following report of my work for the past year as Deputy Inspector of Mines for the District of Pictou, Colchester and Cumberland.

VALE COLLIERY.

I made eleven official inspections of this mine, namely: on January 30, February 22, March 24, April 24, May 9, June 11, August 1, September 16, October 24, November 19, December 27. On all my inspections I found the air good, and every care manifested in the working of the mine. Considerable care and expense have to be bestowed by this company on the roof of the slope to keep it in good order. On some of my visits I found that gas had been given off in the goaf. The management promptly complied with the law in putting on a shot firer.

During the past year they have sunk the McBean slope a further distance of 400 feet. The roof still continues bad, but the coal maintains its height and quality, and thus far no faults have been met in the coal bed.

Greener Seam.—The slope on this seam, with the necessary travelling ways and pipe slope, has been extended a distance of eleven hundred feet, and levels driven east and west a distance of about three chains, and a Cameron pump placed in the bottom of the slope, which discharges the water up to the surface. A small furnace is being built, which will be used temporarily, I am informed, until a fan be erected. I am pleased to be able to say that during the operation of opening up this seam there has not been an accident of any nature whatever; not even a box ran away during all the sinking.

HALIFAX COAL COMPANY.

Slopes No. 1 & 2.—I officially inspected those slopes 12 times during the year, namely: Jan. 24, Feb. 18, March 13, April 15, May 30, June 19, July 31, Aug. 14, Sept. 13, Oct. 17, Nov. 10, Dec. 17, and carefully travelled through the mine, visiting the working faces, airways, inlets,

and outlets. Found the air on every occasion satisfactory. During the year this company have opened a new lift to the dip, and have extended their levels and drove up plane ways.

McGregor Pit.—I visited this pit 14 times during the year, namely: Jan. 12 and 17, Feb. 18, March 20, April 16, May 5, June 17, July 30, Aug. 13, Sept. 15, Oct. 16, Nov. 11 and 14, Dec. 16; and would say that this seam of coal requires great care in operating it as the coal is of a gaseous nature and evolves considerable quantities of gas, but thus far during the past year no one has been burned or any accident occurred through gas.

The air has been sufficient during the past year, but the management have now erected a fan of the largest dimensions of any in the Province, the working of which I have no doubt will greatly increase the ventilation. I found the law in all respects fully complied with on behalf of the management, who on their part exercise every care to compel their workmen to do likewise. On several occasions safety lamps have been damaged either by accident or carelessness, and too much attention cannot be paid to any infringement of this kind in a mine where safety lamps are used.

ACADIA COLLIERY.

I have inspected this mine 13 times during the year, namely: on Jan. 28, Feb. 21, March 10, March 26, April 22, May 29, June 25, July 28, August 26, Sept. 23, October 28, Nov. 25 and December 15, and on each occasion I thoroughly inspected travelling-ways, air-courses, and working faces, and found that the management had an adequate quantity of air traversing through the mine. I also inspected so far as practicable the waste workings.

In my last report I made reference to a new lift as having been driven. So far as possible the coal has been extracted from the pillars in the old lift, and the underground plant has now been transferred to the new lift, and full operations commenced upon it.

INTERCOLONIAL COAL COMPANY.

I have officially inspected this mine 17 times during the year, namely: Jan. 19, February 15 and 19, March 17, April 18, May 6, June 13 and 25, July 29, August 30, Sept. 22, Oct. 20, Nov. 12, 24, 25 and 29, Dec. 29, and as in the preceding mines examined air ways and working faces of the mine and tested the volume of air per minute. On each occasion I found matters in this respect very satisfactory. This company has not resumed work this year in the second seam beyond keeping the water out and the air in circulation. The No. 4 slope is in the same situation. In the old slopes, Nos. 1 and 2 in general, they have been extracting the pillars, and have successfully taken them out from No. 1 side, and have now transferred the underground plant to their new lower lift, which has been developed to enable them to begin full operations upon it. In my report of last

year I referred to the area of up-cast shaft having been enlarged. The management have in consequence had less difficulty with gas than in former years.

CUMBERLAND COUNTY, SPRING HILL MINES.

I have inspected these mines 11 times during the year, namely: Jan. 8 and 9, March 6 and 7, April 23, 24 and 25, May 12, 13 and 14, June 4 and 5, July 5, 7 and 8, Aug. 5, Sept. 2 and 6, Oct. 10, Nov. 5 and 6, December 4.

I have found matters at this mine in a satisfactory condition, the air sufficient and the law complied with. A winning stone drift has been driven from the west side of west slope in the new lift to west side of east slope. Mr. Hall has erected a "blow down" fan at the west slope in addition to the one mentioned last year as working on the north slope. A large portion of the air from this fan is directed into the east side of the east slope, which formerly had natural ventilation only. During the year they have sunk the west slope down a distance of 568 feet, and have transferred the underground plant to this new lift, and are now actively operating upon it.

CHIGNECTO MINE.

I have been at this mine 11 times during the year, namely: on January 12, March 4, April 9, May 16, June 6, July 3, Aug. 4, Sept. 5, Oct. 9, Nov. 4, Dec. 3. In January during my inspection I traversed the workings of this mine, and tested the volume of air, which I found satisfactory, the ventilation being only natural. In May the management had completed a new air way, which was attended with beneficial results. During the summer the mine was idle, except keeping the water out and the air circulating. Some repairs were made during the idle time, such as replacing timber and cleaning up the pit, and it is now in good order. In December, 3 or 4 men were at work extracting coal chiefly for country sales.

JOGGINS MINES.

I have visited this mine 9 times during the year, namely: January 11, April 7, May 15, July 4, Aug. 4, Sept. 4, Oct. 8, Nov. 4, Dec. 2.

Some time previous to my visit in April they had stopped the old slope, and have since been working at the new slope. During the year the ventilation, which is only natural, being somewhat slack, the management have materially assisted it in building a small furnace and cupola.

BOSTON MINING CO.

In January 11th there was a small quantity of coal being taken out of this mine for local sales, and on my visit in March work was suspended altogether, and has remained so ever since.

MILNER MINE.

I visited this mine 7 times during the year. A man named John Hurley has been extracting coal from this area chiefly for local sales —from some time in April up to the present time.

SCOTIA MINE.

I have visited this mine 6 times during the year. The operations have been carried on on a small scale; in fact work was suspended for a large portion of the year. A considerable amount of trouble has been experienced on account of the fire in the goaf, so much so that they were forced to open up a new slope. In October I found a few men at work, and the mine looked satisfactory, but in December, on my last visit, I learned that they had driven the new slope into the workings of the old one and had met with a large quantity of damp, but which had in a short time cleared itself. I went through the opening thus made and travelled to the old slope that had been built off when on fire, and found that the fire had to all appearances been damped out, and that Michael Dunn, who has the management of the mine, was extracting the pillars from the old slope.

MINUDIE.

I visited this mine 9 times during the year, namely: Jan. 10, April 8, May 5, July 3, Aug. 2, Sept. 5, Oct 8, Nov. 3, Dec. 1, and on each of my visits I inspected the mine, and matters appeared satisfactory. A rotary screen has been been erected which works well. The long-wall system adopted in this mine appears to suit this seam, as it enables them to extract a large per centage of the coal.

The Debert Mine, spoken of in my last report, has not been in operation during the year excepting some prospecting. A seam of coal near Salt Springs Station, Cumberland Co., has been opened by Clark, Clish & Co. It presents at the opening a thickness of two feet, and increases as it goes to the dip, and at my last visit, on Nov. 7, it had reached a thickness of three feet two inches. The management are erecting machinery, and sinking a slope on it. On their area there are visable indications of four seams of coal, distinct from the one that is being operated upon.

The foregoing is a condensed summary of the visits made by me during the past season. I have also appended herewith a tabular statement of the volume of air in feet per minute circulating in the different collieries, as well as a condensed summary of accidents, fatal and otherwise, which occurred during the past season.

Table shewing the Quantities of Air in cubic feet per minute, as measured by me in the Cumberland and Pictou Collieries, during the year 1884.

Colliery.	Mine.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Intercolonial Coal Co....	Slopes. Nos. 1 & 2.	97.560	97.000	98.200	96.400	90.200	91.000	100.000	98.000	89.000	90.500	97.700	90.200
	Scott Pit..	Idle	during	the	entire	year.	......	......	......	......	......	......	......
	Slope No. 4.	Idle	during	the	entire	year.	......	......	......	......	......	......	......
Halifax Coal Co. McGregor Pit—shaft..	North side.	25.000	21.000	23.000	24.000	22.620	24.127	15.000	15.300	18.306	21.100	18.955	13.570
	South side.	19.000	13.300	14.000	16.000	17.691	14.192	15.600	14.000	16.066	17.200	12.238	20.172
Halifax Coal Co. Douglas Seam—slopes..	No. 1	22.500	21.700	22.720	24.720	21.750	21.850	20.880	21.600	16.506	24.750	24.000	26.250
	No. 2	23.760	22.500	23.400	22.520	20.520	20.520	21.000	21.000	17.200	20.560	20.100	23.200
Acadia Colliery, Westville..	1 Slope ...	54.700	54.000	56.000	56.230	65.600	64.600	66.300	59.640	64.400	63.843	65.700	64.600
Vale Co. McBean	1 Slope ...	50,000	47.500	54.000	55.000	53.000	40.000	....	40.600	50.000	59.000	60.000	65,000
Vale Co. Greener	1 Slope ...	9.000	9.700	13.000	11.550	11.100	12.000	Idle.	10.500	9.000	9.400	Idle.	Idle.
Spr'g Hill Mines. West	1 Slope ...	15.000	......	21.000	27.200	24.300	18.400	23.600	17.300	19.000	20.000	26.300	28,000
Spr'g Hill Mines. East	1 Slope ...	25 000	......	26.000	32.200	30.100	29.000	27.776	39.400	29.000	31.000	31.931	31.000
Cumberland Co. North	1 Slope ...	19.000	......	17.500	28.000	26.700	28.000	30.535	26.000	30.000	41.168	36.500	38.300
Cumberland Co. South	1 Slope ...	......	......	12.000	9.000	11.700	12.100	....	......	......	Idle.	Idle.	Idle.
Chignecto	1 Slope ...	18.000	......	20.000	21.600	24.000	12.250	13.000	Idle.	Idle.	Idle.	Idle.	23.000
Minudie	1 Slope ...	6.000	......	.....	6.325	7.000	Idle.	5.400	3.430	4.280	4.300	4.700	5.200
Scotia....................	1 Slope ...	3.000	......	2.700	1.300	Idle.	Idle.	Idle.	Idle.	Idle.	1.700	......	2.000
Joggins	1 Slope ...	8.000	......	Idle.	10.880	11.000	11.550	12.200	13.000	10.240	14.820	13.550	13.100
Milner	1 Slope ...	Idle.	......	Idle.	.460	Idle.	Idle.	.400	.340	.300	.450	.470	.400

I remain, yours truly,

W. MADDEN, JR.,
Deputy Inspector of Mines.

CAPE BRETON.

BRIDGEPORT, C. B.,
January 3rd, 1885.

E. GILPIN, ESQ.,
Inspector of Mines:

DEAR SIR,—I beg leave to submit the following report on my work as Deputy Inspector of Mines in the Island of Cape Breton.

Sydney Mines.—I have visited this mine ten times during the past year. There is no perceivable change in the underground workings at this mine. Coal is mined, levels and deeps advanced in their usual way. Two miners were injured in their bords by pieces of coal and stone falling on them, also there were two men injured on the surface by the bursting of a locomotive fire box. I enclose you a table showing cause of these accidents, and of all other accidents that occurred in this district for the past year, also tables showing number and dates of visits and amount of air circulating at each visit.

Victoria Mines.—I have visited this mine ten times. The levels on both sides of the slopes have been extended considerably, and headways driven to the rise and back balance placed therein. The engine house and bank have been completed, and the coals are drawn from the slopes by the new engine.

Barrasois Mines.—This mine is situated about half way between the Victoria and Lingan Mines. Work commenced there this summer, and a slope is being driven from the surface through the roof above the coal in the direction of the dip about one hundred feet, where it connects with the seam. The seam is six feet thick, and appears to be a very good quality of coal.

Lingan Mines.—I have made eleven visits to this mine. The working here was chiefly confined to the lower lift, the levels have been driven, and a number of bords broken off. A larger cupola has been built to replace the one that was burned last September.

International Mines.—I have visited this colliery nine times. There has not been much change in the workings at this mine except the drawing of pillars above the line of the upper levels and the splitting of some of the pillars on the second lift.

Reserve Mines.—I have made nine visits here during the past season. The levels in this mine have been extended, headways driven, and bords broken off. A drift is in the course of being

driven from the present seam to connect with the Emery seam that lies below it. The drift is now down about five hundred feet. The Manager says he will strike the coal after extending it four hundred feet further. A young man named Foreman Stubbart and a younger brother had charge of a bord in the mine when the accident occurred causing the death of the former.

Caledonia Mines.—I visited this mine nine times. The underground workings here were carried on in their usual way. The extraction of pillars was carried on very satisfactory, they took nearly all the coal out of them.

Sterling Mines.—I visited this colliery seven times. The coal that was shipped from the mine during the past season was taken from bords already broken off, which have been well timbered and put in good order.

Ontario Mines.—I visited this mine seven times the past year. The little coal that was drawn from this mine during the past season was mined in the second lift on the north side of the slope. The managemen there failed to get the water out of the dip workings, they have taken up the rails and have drawn up the water pipes. The water has risen as high as the lift the men worked in this season, however before it rose the workings were well timbered.

Block House Mine.—I visited this mine five times. The coal that was shipped here during the past season was taken from the pillars, except a small portion from the deeps.

Gowrie Mines.—I visited this colliery eight times. The western levels were driven a considerable distance and bords broken off. A continuation of the travelling road referred to in last year's report has been extended two hundred yards down to the main level. There have been two over windings of the cage here this season, one in September and the other in November, the cage was caught and held successfully both times at the pulley wheels by the patent detaching hooks. There were no men riding at either time.

You will observe by the tables of air that there is a great difference in the number of cubic feet circulating per minute in a mine, at one visit more than at another. The cause of this is, that when a pit is idle the fires in the furnace are generally neglected, and my record of air circulating is smaller than when they are working. In conclusion I beg to draw your consideration to one thing, that is boys and inexperienced men being given working places in pits. It often happens that a young man from the country starts to work as a loader with a miner for a summer. In the fall, when the work ceases, he returns to his home and comes back the next spring with a loader of his own to one of the mines, and gets work as a miner with his loader, and then gets charge of a working place. The result is this inexperienced miner and his loader make dust of the coal, and are not capable of taking care of themselves. I would suggest that a law be passed not

to allow any person to get charge of any working or leading place in a pit unless he has had three years' experience.

Old Bridgeport Mines.—I have made two visits to this colliery. The shaft is about one hundred and twenty feet deep. It was cleaned out this season. There is a water level from it about $\frac{3}{4}$ of a mile to the sea shore. A headway has been driven westwardly from the pit bottom, and boards broken off right and left. The coal is hoisted to the surface by a small engine and tubs. The management intend driving a travelling road this winter, and putting the mine in good order. A railroad has been completed on the surface, connecting with the International Rail Road.

I am not aware of any other points in connection with the mines in my district that I need refer to.

Number and Date of Visits made by Deputy Inspector to Mines in Cape Breton for the year ending December 31st, 1884.

Mines Visited.	No. of Visits.	DATE OF VISITS.											
		Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Sydney Mines	10	23	......	27	25	20	14	19	27	23	8	......	11
Lingan	11	......	19	26	17	16	12	18	15	12	30	28	15
Victoria	10	......	20	26	24	......	13	23	29	24	31	29	17
Barrasois	1	......	......	......	......	......	......	......	......	......	......	......	15
International	9	16	......	7	17	24	16	17	18	10	10	......	10
Reserve	9	25	......	......	13	10	21	16	......	9	7, 24	......	6
Caledonia	9	......	......	5	16	12	10	22	22	13	15	24	3
Sterling	7	15	......	5	......	10	11	22	21	15	16	27	4
Ontario	7	......	......	......	......	23	18	24	14	19	13	25	10
Block House	5	19	......	15	......	14	17	10	......	25	27	......	13
Gowrie	8	19	......	15	15	14	17	11	30	26	27	......	13
Old Bridgeport	2	......	......	......	......	26	......	......	......	......	25	......	......

Report of the Number of cubic feet of Air passing through Mines in Cape Breton for the year ending December 31st, 1884, as measured by me during my official visits.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Sydney Mines	Idle.	......	50.320	56.210	54.668	66.560	48.800	52.260	55.500	55.700	......	64.000
Lingan	Idle.	18.000	17.640	......	26.480	24.000	23.480	18.600	20.000	22.550	23.000	25.300
Victoria	10.000	10.200	10.000	15.000	......	7.560	9.900	10.092	15.000	14.210	......	15.400
Reserve	Idle.	Idle.	......	......	30.830	33.000	29.010	22.000	31.300	30.000	......	23.800
International	......	Idle.	Idle.	20.250	32.600	37.000	36.730	33.000	38.000	36.700	......	15.000
Gowrie	......	......	......	10.000	22.500	27.000	26.000	26.660	27.000	27.500	......	28.000
Caledonia	......	......	......	19.802	33.655	31.500	36.000	36.389	38.130	39.370	......	15.000
Sterling	......	......	......	......	21.004	12.830	......	19.000	19.000	20.000	15.000	16.500
Block House	......	......	......	......	25.831	25.000	24.000	......	25.500	......	......	......
Old Bridgeport	......	......	......	......	......	......	......	......	......	8.000	......	......
Ontario	......	......	......	......	......	10.000	7.900	9.000	8.000	......	......	......

I beg to remain, yours truly,

P. NEVILLE,

Deputy Inspector of Mines.

GOLD.

The returns show that 118,087 days' labor were performed, and 25,147 tons of quartz were extracted and crushed, yielding 16,079 oz., 14 dwts., 10 grains of gold, during the year 1884.

The result of the past year's work again shows an increase in the yield of gold of 632 ounces over the preceding year.

The average yield was 12 dwts., 18 grains per ton of quartz, etc., crushed; this is 1 dwt., 21 grains higher than the average for 1883, and is partly due to the lessened amount of low grade ore crushed in Sherbrooke.

The following mines have worked steadily during the past year, viz.: the Gallagher, Darr's Hill, Brunswick, Oxford and Empress, and have made satisfactory returns. Other mines are getting under way with good promise of steady operations during 1885, among which may be mentioned the Bluenose mine, Montagu, Leipsigate, Rawdon, and Fifteen Mile Stream which it is hoped will yield a return proportionate to its reputation for richness.

Several large lots of low grade ore have been profitably mined, among them may be named 9,799 tons at Salmon River, yielding at the rate of 6 dwts., 20 grains per ton; and 1,679 tons at Renfrew, yielding at the rate of 6 dwts., 18 grains per ton.

The richest yield the returns show is 2,212 oz., 8 dwts. from 913 tons of quartz crushed by the Gallagher Gold Mining Company, being an average of 2 oz., 8 dwts., 10 grains to the ton.

In view of the steady production now maintained by the principal mines, and the promising prospects of several new districts, it is to be hoped that the year 1885 will show a considerable increase over the results recorded for the year just passed.

DISTRICTS.

Caribou.—The returns for 1884 shows that 1,559 tons were crushed, yielding 966 ounces as compared with 2094 tons, yielding 477 ounces during the preceding year. There was a little work done by Mr. McDonald near the free claim. The Caffrey mine was unwatered, and the lead found to be four inches thick at a depth of two hundred

feet. The reason given for the abandonment of the mine was the inadequacy of the pumps.

Messrs. Stuart, Gladwin and others opened a lead on Lease 162, near the lake, and sank about 35 feet on it. The measures dip south at an angle of forty-five degrees, and the lead cuts them on an irregular northerly course and westerly dip. It is curiously contorted in the slates, and in several points resembles the vein worked at Oldham, year before last.

At Moose River, Mr. Touquoy worked on Lease 140, on the Little North lode and on the Copper lode, in the spring. Later in the season he sunk 30 feet on the North lead, on the same lease, and worked for some time. The North, Copper, and Little North leads were worked on the Moose River Gold Mining Company's property by tributors. Messrs. Taylor and Walker worked on their areas.

DARR'S HILL.—Work has been steadily continued at this mine, and the extension of the faces has been kept up. The milling facilities have been increased, and the returns show that 9,799 tons of quartz were crushed, and yielded 3,379 ounces, against a return from the same district during 1883 of 7,602 tons of quartz crushed and a yield of 3,885 ounces of gold. The returns from the mine show that up to the close of the year 22,373 tons of quartz had been crushed and yielded 13,123 oz., 7 dwts.

FIFTEEN MILE STREAM.—Mr. R. G. McDonald did a little work on the Orion lead of the Hall-Anderson property during January, and in November the Company resumed work. The mill was fitted with electro-plated aprons, and arrangements made for concentrating the sulphurets.

Mr. James Hudson put up an engine for hoisting and pumping on his area in April. A new lead was found, by tunnelling north from the operations referred to in my last report, and on being opened up showed at a depth of 45 feet, a slate belt three feet wide yielding 24 dwt. per ton. Mr. J. G. Hudson, the manager of the mine, reports that he expects to have their crushing mill in operation before the spring. A little prospecting was done north of the Hall-Anderson property.

GAY'S RIVER.—Messrs. Pulsiver and Holdsworth did some prospecting during the summer, but mining in this district remains at a stand still.

MONTAGU.—In this district the Bluenose Gold Mining Company have continued working the DeWolf areas. They have opened up a lead in the eastern part of their property which is considered to be an extension of the Rose lead formerly worked a short distance to the eastward. Three shafts have been sunk, the main shaft being about 115 feet deep, and they show two leads respectively 10 and 5 inches in thickness. The returns show very good results. About 60

feet to the north a very rich lead is being opened by a shaft now 83 feet deep. This is called the DeWolf lode, and shows two veins 6 and 4 inches thick, which with two inches of intercalated slate yield one foot of crushing material. Mill tests have shown it to run 4 ounces to the ton. This mine promises to bring the district again to the front as a good field for work, and is fully equipped with an 8 stamp crusher, houses, whims, pumps, etc.

Mr. Gladwin did some work on the British American areas adjoining to the eastward, and proved the continuation of the veins referred to above.

The concentrator noticed in my last report worked for a short time during the summer.

OLDHAM.—Mr. A. McDonald sank on a barrel lode, from one to twelve inches thick, at the rear of the Stirling properties, to a depth of about 100 feet and carried a stope to the westward. Messrs. Fenwick, E. C. McDonald and others did some tribute work.

In the fall Mr. J. E. Hardman made arrangements for working the Lowell, Fraser, and Baker properties together, and is successfully mining a slate belt carrying low grade ore. It is proposed to re-open the main shaft on the Baker lead and to sink it to the point of intersection with the regular lodes of the district. The returns show 824 oz., 15 dwts., 12 grains from 921 tons of quartz.

RENFREW.—The returns show a yield of 1,679 tons of quartz and 569 oz., 18 dwts. of gold from the Empress mine, under the management of Mr. A. A. Hayward. The work commenced last year has been systematically carried on. The main shaft is being sunk 100 feet further to open a fresh lift. The hoisting and pumping appliances are well planned, and work very satisfactorily.

It may be mentioned here that part of the road from Enfield station to the mines has fallen into bad repair, and it is to be regretted that no steps have been taken to improve it.

A little prospecting has been done at a few points in the district.

SHERBRROOKE.—The returns show that 3,268 tons of quartz were mined and crushed with a yield of 2,668 oz., 11 dwts., as compared with 8,470 tons of quartz, giving 3,356 oz., 18 dwts., 17 grains during the preceding year. The highest returns were made during March when they showed 380 oz., and the lowest were 99 oz., in September, probably the smallest ever recorded from this district.

The Pactolus worked a small lead on the Rockville property, and Mr. D. R. Cameron worked its extension in the Gold Hill property, but it was soon abandoned. The large belt in the Pactotus was allowed to fill with water. A new lead was opened on the Wellington

property, a few feet north of the Dewar lode, but it did not come up to expectations.

Mr. Williams worked the Hayden and Derby and the New York and Sherbrooke properties, and at present this is one of the best paying properties in the district.

Some work was done on the Alexandria and Dominion areas. Messrs. McNab and Sinclair did a little work on the Caledonia property in the fall.

Most of the crushing of the past season was done in the Goldenville crusher, which was used as a custom mill.

The mining in this district is mostly on the tribute system, a rent of ten per cent. of the gold production being paid to the owners of the property. This coupled with the royalty forms a heavy tax on the adventurers. It is stated that many leads in the district, now lying unworked and filled with water, would be opened if they could be taken at a low rent.

Cochran's Hill.—This district has not been worked during the past year. It is one that promises well, as gold can be readily found over a considerable area, but hitherto no systematic mining has been carried on.

Stormont.—Operations in this district have been practically confined to the property of the Gallagher Gold Mining Company. They have extended their workings from the main shafts. The returns show that 913 tons (including some old dumps) were crushed, and yielded 2212 oz., 8 dwts. The total returns from this mine now show 1,978 tons crushed, and a yield of 5,034 ozs.

Uniacke.—Mr. Davidson continued working on the hill until the fall, and attained a depth of 275 feet. Horses were used for hoisting, and at present operations are suspended, until an engine is put up.

Mr. Prince took out some lots of quarts from the Uniacke and other areas, and tribute work was done on the Montreal, Union, and other areas. The returns show a yield of 2235 tons of quartz, and 1140 ozs., 6 dwts, 2 grns. of gold as compared with 2,809 tons and 1,197 ozs. during 1883.

UNPROCLAIMED AND OTHER DISTRICTS.

Yarmouth.—Some prospecting was done at Chegogin Point, and near Cranberry Head. At Kemptville, about 23 miles from Yarmouth, Messrs. Ryerson, Reeves, Cowan, and others did a good deal of work, and are making arrangements for erecting a crusher. A number of leads from four to eighteen inches in thickness were exposed and

traced for several hundred feet. Some of these leads shows gold, and the district is worthy of further attention. It is in measures in every way similar to those proved auriferous to the eastward, and ample water power can be had within a reasonable distance.

Discoveries of gold were reported from several points between Annapolis and Liverpool.

Leipsigate Lake.—The operations of the Messrs. Hall and Owen show a return of 130 tons crushed in the fall, yielding 410 oz. Fifty tons of which gave 250 ounces. It is to be hoped that this promising district will rank next summer among the best of the provincial mines. A crusher of ten stamps, driven by steam, has been built near the cross lead.

Indian Path.—Here the main shafts on the big lead have been pumped out and put in thorough repair. About 20 tons of quartz have been taken out for a trial crushing. A new mill of 10 stamps, with all necessary fittings, was built by Mr. Henry Archibald. It is driven by steam, and it is expected that work will shortly be started.

Rawdon.—Promising developments were made here during the spring by Messrs. Simms and White on a lead four to seven inches thick, and on a belt carrying several leads from fifteen to twenty-five inches thick. A ten stamp mill was put up during the summer and the returns show that 217 tons were crushed yielding 241 oz., 7 dwts., 11 grains. This district is in an isolated position, but being in the auriferous measures of the Province, and showing good results, it merits more attention than it has yet received.

Stewiacke.—The mill on the south branch was rebuilt, and a few tons of the low grade ore at the Saw mill were crushed. About three miles west of this point some prospecting was done by Mr. Chandler in conglomerate.

Chezetcook.—In this district operations have been principally confined to the property of the Oxford Gold Mining Company. The returns show that 2,464 tons of quartz were crushed during the past year, and yielded 1,887 oz., 18 dwts., making the total returns 5,479 oz. from 4,550 tons of quartz. Mining has been carried on in the Mill and Coleman lodes to a depth of about 100 feet. Hoisting power, etc., is carried to the shafts by wire rope from the mill house, where additional engine power has been put up. The surface arrangements have been improved, and additional accommodation provided for those engaged about the works. The property has now one of the best mining plants in the Province, and its history has hitherto been a very successful record.

It is to be regretted that no regular work has yet been started on the other auriferous lodes of this district, as it promises to be one of the best in the Province.

COPPER.

During the past summer Mr. A. C. McDonald did some prospecting on a copper vein at Scott's Hill, Pictou Co. A little work was done at the Margaretville Copper, Annapolis Co. Here native copper and carbonate is found in the joints of the trappean ash, and the indications would appear to warrant further development. A few tons of copper is reported to have been extracted from one of the Pugwash deposits of gray copper ore. In this connection the developments being made at Dorchester, in New Brunswick, lead to a hope that some of these upper carboniferous deposits may have value in Nova Scotia.

Near Antigonish a deposit of copper ore was said to have been found in the fall. Some work was done near Whyhogomah on a vein of copper pyrites in a diorite band.

In the Ohio district an opening was made on a deposit of yellow and gray copper ore, yielding 1,120 lbs. of copper, $6\frac{2}{3}$ dwts. of gold, and 3 oz. of silver to the ton.

Coxheath.—During the past year about 275 feet of drifting have been made to the north and to the south in the 190-foot level. During the progress of this work about 100 tons of 8 per cent ore were taken out. In addition to proving the continuity of the vein of ore found in the 140-foot level two new and promising veins were cut, which yielded about ten tons of 10 per cent ore from the exploratory drifts. One of the veins yielded some 30 per cent ore. The result of the exploratory work carried on under the superintendence of Mr. VanSlooten are stated to show in sight about 1,000 tons of ore between the 140 and the 190-foot levels, running from 5 to 10 per cent of copper, with good promise of continuity in depth.

The following estimate of Mr. Van Slooten would show that copper matte can be produced at Sydney under very favorable circumstances.

Assuming that 7 tons of 5 per cent ore will make one ton of 32 per cent matte, and a daily output of 50 tons:

Mining, dead work and transport to tide-water of one ton of ore		$2.50
Smelting	Coke, $\frac{1}{6}$ of a ton, $1.50	0.25
	Iron ore, $\frac{1}{3}$ of a ton, @ $1.50	0.67
	Labor	0.25
	Superintendence, oil, coal, etc.	0.25
Freight to Swansea, 1-7 ton of matte, @ $5		0.72
Port charges and storage, 1-7 of $1.75		0.25
Commissions, assays, etc.		0.72
Total		$5.61

Which would leave a good margin even at the present low prices of copper.

IRON.

STEEL COMPANY OF CANADA.—During the past season the company continued working the East and West Mines. Preparations are being made for sinking below the No. 7 level, and an underground engine will be used for raising ore from the deeper workings. The company finding that they had large quantities of "Spathic ore" available in addition to the limonite which has hitherto been exclusively smelted, have begun to use it in their furnaces.

This mineral also known as Sideroplesite (classed by Dana as a variety of ankerite) is I believe found in few places in quantities making it valuable to the iron smelter. In general terms it may be described as ankerite with its calcic carbonate replaced by ferrous carbonate. Mr. Henry Louis, late analyst to the Steel Company of Canada, gives the following analysis of it, which shows that it is an important source of iron:

Insoluble silicious mater	.47
Calcic carbonate	.59
Ferrous "	69.20
Manganous "	1.37
Magnesic "	28.73
Ferric oxide	.08
	100.44

At first this ore was found in the West Mines mixed in strings and veinlets in ankerite, as the workings were deepened it became freer from ankerite; which at many points is present in very small amounts. The extensive deposits of this ore in the mine warrant the expectation that it will prove of much future economic value. Kilns have been erected for calcining it before it is introduced into the furnace. The returns of the mine shows that 54,885 tons of iron ore and 5,799 tons of ankerite were extracted during the past season.

On the East River, Pictou Co., some explorations were made on the farm of Mr. W. Grant by the Steel Company of Canada; and at other points by Mr. R. P. Fraser of Pictou. It is greatly to be regretted that no successful attempts have been made to utilise the large and varied iron ore deposits of this county.

Discoveries of iron ore were reported from Lorne, Pictou County, Whyhogomah, Inverness County, and Malvern, Annapolis County. Near Digby some prospecting was done on small veins of Magnetite in the Triassic Trap near its junction with the underlying sandstone. Analyses of the ore are said to show:

Iron	60.430
Silica	14.320
Phosphorus	.036
Sulphur	.046
Titanic Acid	none.

ANTIMONY.

During the past year a valuable mine of antimony ore has been opened out at Rawdon, Hants Co. Two shafts, about 120 feet apart, have been sunk about 175 feet, and levels driven, and 600 tons of No. 1 ore raised. The vein, which is of gray antimony ore, is from 4 to 18 inches in width, cutting talcose slates. There is little impurity present beyond small amounts of quartz and calcspar. An analysis by Mr. M. H. Smith, made in Dr. Lawson's laboratory, Dalhousie College, showed the ore to be almost of chemical purity, having little beyond mere traces of foreign material.

This discovery has led to prospecting for other depo its of the ore, and it is probable that a large district here will be found to yield it. Similar ore has been reported from Upper Stewiacke.

As this ore is new in Nova Scotia, and may prove a source of profitable mining and smelting, I add a few remarks on it which may be interesting.

The metal antimony is occasionally found native. It occurs sparingly in this form at the Prince William Mine in New Brunswick, and is met in veins of silver and other ores in the Hartz and in Mexico. Its color and streak are tin white, and it is usually presented in the massive form with a distinct lamellar structure, which serves to distinguish it from native bismuth. The latter metal is of a silver white color with a tinge of red, and nearly as heavy as lead, while antimony is a little more than half as heavy. Native bismuth is as hard as crystaline gypsum (soft gypsum), while the hardness of antimony approaches that of anhydrite (or hard plaster.) Both these metals fuse and evaporate at a low heat.

The chief source of the metal however is stibnite, sulphuret of antimony, or gray antimomy ore. This has a lead gray color and streak, and a shining lustre. It is brittle and usually columnar or fibrous. When heated in a candle flame it fuses readily, and before the blow pipe on charcoal it is absorbed, giving off white fumes and a sulphur odor. It resembles the common lead ore (galena) in color and lustre, but is distinguished by its extreme fusibility, and by being little more than half as heavy. The hardness of stibnite, that of soft gypsum, is slightly less than that of lead ore. There are a number of combinations of sulphur with antimony and lead resembling the gray ore, which fuse easily and give the reactions for antimony and lead.

Another mineral frequently found in this Province, which resembles antimony ore is the Sulphuret of Molybdenum. It may, however,

be distinguished by its extreme softness, permitting of its being indented by the finger nail, and by its feeling somewhat "greasy," like the purer forms of graphite. Antimony ore when pure contains in round numbers seventy-three per cent. of antimony and twenty-seven of sulphur. All ore carrying above forty per cent. of metallic antimony is classed as No. 1, that of a lower per-centage is ranked as No. 2.

Antimony ore is found in veins in rocks of varied age, and is frequently associated with ores of silver, gold, lead, iron, arsenic, etc. It occurs in the granitic and crystalline schists of Auvergne, Hungary, the Hartz, and Bohemia, and has been worked to some extent in Cornwall. In the United States several rich deposits are known on the Pacific Slope, but the distance from New York, the principal market, has as yet rendered all attempts at its reduction unsuccessful. In 1882 the amount reduced in the United States was about 60 tons valued at $12,000. The annual consumption of the metal in the Pacific Coast is estimated at 25 tons.

The returns of the mines inspectors for 1883 show that it is not now mined in England. Upper Sarawak in Borneo is one of the chief sources of this ore, but the supply seems to be decreasing for the amounted exported in 1883 was 1,361 tons against 1,856 tons in 1881, and 1,440 tons in 1882.

In New Brunswick the ore is found in strata of lower silurian ? age, and has been intermittently mined and smelted during a number of years. The age of the strata holding the Rawdon antimony ore is not yet known from any survey, but it may provisionally, from their relation to the Rawdon auriferous strata, be considered lower silurian.

The ore is readily smelted and forms several alloys of great commercial value. It is used in making "type metal" which is said to contain one part of antimony to six of lead, and a little tin and bismuth. This alloy expands a little on cooling, and ensures a sharp, clear letter. Britannia metal which is superseding "pewter" contains 100 parts of tin to 8 of antimony, and either 2½ parts of each copper and brass, or 2 parts of copper and bismuth. An alloy of tin with antimony forms the metal on which music is engraved. Glass of antimony is a mixture of sulphuret and oxide formed by partial reduction and fusion of the former. Babbit metal, well known for its use for machinery bearings, etc., consists of 83.3 parts of tin, 8.3 of copper, and 8.3 of antimony.

GYPSUM.

The total exports were 11,068 tons, against 144,688 tons during the preceding year. Mr. E. O'Brien, the Collector of Customs, attributes the falling off in the exports from the Windsor district to the Presidential election in the United States, and it is anticipated that the exports during the year 1855 will resume their normal volume.

At Windsor operations are carried on almost exclusively by Mr. Edward Dimock, who has, I am informed, combined the various quarries in the St. Croix River. During the past season he has replaced the horse tramway from the quarries to the river by a railway of standard gauge, equipped with a locomotive and a set of self-tipping five ton cars. The openings into the various quarry faces will allow readily of a daily shipment of 500 tons of gypsum. The amount shipped from Windsor last year was 80,072 tons. The quality of much of the rock was very good.

The New York Plaster Company reopened the old quarry at Grandique Ferry, Richmond County (said to have been worked by the French during the occupation of Louisburg), and built a wharf. It is expected that a considerable trade will be done during 1885.

The Messrs. McCurdy of Baddeck did not ship from their quarry on Baddeck Harbor, but sent away 2,795 tons from another quarry at St. Anne's, chiefly to Quebec.

MANGANESE.

The total produce of manganese ore during 1884 was 302 tons. Mr. J. W. Stephens continued working his mine at Tenny Cape, and small lots were mined at Cheverie.

At the East Mountain, near Truro, Messrs. Stevens and Carter took out about 30 tons of very good pyrolusite from the drift, and have, it is reported, found the vein which they consider to have yielded the drift ore.

At Loch Lomond, in Cape Breton, Mr. E. T. Moseley has continued working the Moseley manganese mines, and states that he is prepared to supply high grade ore, guaranteed 90 per cent of binoxide. He has put up machinery for hoisting and pumping, and done preliminary work.

LEAD, ETC.

SMITHFIELD.—One hundred tons of ore, averaging about 40 per cent of lead, were taken out in the fall, and a small smelter erected. The ore was burned in heaps, and it was found that calcination was not carried far enough. Calciners were then put up, and after proper roasting the ore was found to be self fluxing. The inception of this undertaking is extremely interesting, as the establishment of lead smelting will mark a new departure in the mining industries of the Province.

ACCIDENTS.

During the year 1884 the following Fatal Accidents occurred in Nova Scotia Mines.

No.	Date.	Name of Mine.	Name of person killed.	Occupation.	Remarks.
1	January 12..	Albion	James McLellan	Trapper	Left his door and was killed by the rake striking him.
2	March 7	Acadia	Peter Gillis	Loader	Fall of coal.
3	August 20 ..	Spring Hill	Frederick Crocker	Miner	Attempted to get on water-box, and was jammed against timber.
4	October	Reserve	Foreman Stubbert	Miner	Coal parted from lype while he was shearing.
5	November 4.	Albion	William Campbell	Miner	Premature explosion of shot from use of iron tamping-bar.
6	November 22	Sherbrooke	Andrew Stearns	Miner	Improperly thawing dynamite.
7	November 29	Londonderry ..	Richard Perry .... Thomas Vigend........ Nathaniel Rushton .... Olive Rushton	Miners	Shaft of winding-engine broke, and they were thrown down the pit.

I would remark, with reference to the foregoing accidents:

1. This boy was employed on one of the McGregor slants, and provided with a safety hole, and with a rope to open the door. From the position he was found in after the accident it was evident that he had left his post.

3. This accident occurred as a direct violation of the special rules. From Mr. Madden's investigation into the accident it appears that he had endeavored to get on the iron water tank as it was being drawn out of the sump, and, failing to do so, was caught between the tank and some timber. The injuries he received proved fatal after a few days.

5. The death of William Campbell, who held a certificate of competency as underground manager, and the severe injury of his partner, arose from his iron stemmer igniting the charge. A similar accident, fortunately unattended with fatal results, befell George and Cyrus Simpson, in the Springhill Mines, November 21st. On the 9th of June Donald McKay was similarly injured at the Albion Mines, and another accident of the same character occurred at these mines early in the season.

7. This accident, by which John McInness and Samuel Chisholm were also severely injured, happened at the Dufferin shaft, which is two hundred feet deep. The engine had been working as usual during the morning, and after the dinner hour a party of six men started to go down. The drum barrel jumped from its position and the cage became uncontrollable; about the fifth level it appeared to have entered the slides, and the men fell the remaining distance of nearly 25 feet. The cause of the accident was the fracture of the drum shaft at the centre bearing. The shaft, which was a new one, and amply large for the weight, proved on examination to have had a flaw; but it had evidently been severely strained, as it was partially twisted. It has been conjectured that the cage might shortly before the accident have struck the timber in the pit and been strained, thereby causing a weakness which resulted in fracture. The flaw had not been detected during the turning of the shaft.

This accident recalls, in many particulars, the slope accident at the Vale Colliery, and the discovery of a reliable method of testing ropes, bolts, bars, etc., would prove a great boon.

There were five cases of fractured limbs from fall of coal—nearly all from coal loosened by shots. Several persons were injured by riding on rakes and back-balances, and in some cases narrowly escaped with their lives. It is strange how men will try to steal a ride to save themselves a safer, if more tedious, journey on foot.

A trapper boy in the McGregor pit left his door and obtained some powder, which he fired by a light he got by opening his safety lamp, and was severely burned. Two boys playing in a somewhat similar

manner managed to set the Vale Colliery seam on fire; fortunately the fire was put out before any damage was done.

I may remark that, so far as I am aware, no accident of any kind occurred from ignition of fire damp.

MISCELLANEOUS.

The following is a list of the men who have received certificates from the Board of Examiners:

CERTIFICATES OF COMPETENCY—UNDERGROUND MANAGERS.

Thomas Scott	Springhill.
Henry Swift	"
Thomas Routledge	Sydney.
Hugh Campbell	Cow Bay.
James Baird	Chignecto.
J. G. S. Hudson	Stellarton.
James Maxwell	Westville.
Alex. McInnis	Springhill.
F. Burrows	Springhill.
F. Park	East Mines, Debert

OVERMEN.

Alex. McDonald	Stellarton.
James Rogers	"
George Wilson	Chignecto.
A. L. Edmunds	Cow Bay.
Ed. Wilkinson	Stellarton.
John Weir	"
W. Reese	Springhill.
M. Dunlap	Chignecto.
W. Lorimer	"
Allan C. McKinnon	Springhill.
John Maxwell	Stellarton.
Allan Caldwell	Sydney Mines
A. D. McKenzie	Stellarton.

CERTIFICATES OF SERVICE—UNDERGROUND MANAGERS.

John Dunbar	Stellarton.
R. Redpath	Minudie.
R. Wilson	
W. Conway	Springhill.
A Purvis	Westville.
M. Walters	Glace Bay.
Henry Morley	Cow Bay.
John Johnstone	Bridgeport.
John Douglas	Stellarton.
Thomas Turnbull	Vale Colliery.
George Scott	Caledonia.
Joseph Simpson	Sydney Mines.
W. McNamara	Lingan.
P. P. Burke	Joggins.
A. L. Anderson	Cow Bay.
W. Adamson	Glace Bay.

OVERMEN.

William Young	Lingan.
Angus McKeigan	Bridgeport.
George Kay	Sydney Mines.
J. B. Greenwell	" "
John McKay	Stellarton.
Thomas Johnston	Cow Bay.
T. Fletcher	Reserve.
James Johnstone	Westville.
Ed. Harris	"
J. Bradley	Springhill.
Mat. Spoors	Vale Colliery.
W. Stafford	N. W. Territory.
D. Hayman	Westville.
Jas. Findlay	"
Jas. Hunter	"
J. J. Duff	"

The candidates who presented themselves last year were chiefly overmen holding certificates of competency and desirous of advancing themselves to the position of underground manager. The papers showed that much care and trouble had been taken by the candidates; but they were deficient in one branch, that of surveying, although the standard in this was not high. It is impossible for men to get any knowledge of surveying as applied to pit and colliery purposes unless they are taken by the hand and taught it practically. I may say for myself, as a member of the board, that unless readily accessible means are provided for some candidates of instruction in surveying and the elementary principles of mining, I feel that the work of the board will not prove satisfactory.

The Employment of Compressed Air in Ventilation.—The use of fans and blowers for driving places off the air is well known. Hitherto all attempts to utilize compressed air, etc., for driving these machines have proved expensive and unsatisfactory in coal mines, although compressed air, intended primarily for drilling, has been found a useful adjunct to ventilation in metalliferous mines. Experiments have been made in Germany which show that the direct use of compressed air may be found advantageous under some conditions of coal mining. A plant compressing air up to four atmospheres furnished a supply equal to the ventilation of forty-five working places. The air was carried in zinc tubes and delivered through an aspirator. The total delivery of air was 15,500 cubic feet.

Safety Lamps.—The recent enquiry made by the Midland Institute of Mining Engineers into the comparative efficiency of the best known safety lamps, presents many points of interest to coal miners. It was found that in an explosive current travelling at the rate of from 6 to 14 feet the ordinary Muesler, the Clanny, the Davey, the Stevenson, the Thompson and the Bainbridge lamps, were unsafe. Further experiment showed that the improved and protected Mueseler, the Routledge and the Johnston and Purdy lamps were safe until the current reached a velocity of 19 feet per second, when the Mueseler lamps exploded by an oblique ascending current. On increasing the current to 35 feet the lamps that proved the best were those of the Smethurst type (fitted with a bonnet), the improved and protector Mueselers, and the Routledge and Johnston.

Coal Banking.—Where the shipment of coal cannot be carried on continuously thoughout the year, as is unfortunately the case with most of our coal mines, recourse must be had to banking out the product of the pit. The loss arising from the repeated handling, and the disintegrating effects of our changeable climate, frequently make the operator hesitate to work his mine when he cannot see any chance of immediate shipments. Attempts have been made to "bank" coal underground in the working places, but it does not appear that any decided advantage is gained. When large amounts of coal have to be shipped rapidly from a mine working up to its capacity the underground stores of cut coal cannot be largely drawn upon without interfering with the regular work of the pit, while the surface bank can generally be utilized to any desired extent. In this connection the following account of a cheap and readily available plan for lessening the breakage of bank coal taken from the *Engineering and Mining Journal* may prove interesting to our managers of coal mines:

Wenzel Koech, of Karbitz, Austria, argues that if coal is placed in an atmosphere of steam, which excludes oxygen from the coal, the hygroscopic water will have no tendency to leave the pores of the coal, nor can a chemical action set in, even in the presence of pyrites, the oxidation of which is, under other circumstances, essentially promoted by the presence of moisture. It is, therefore, not to be doubted that, by displacing the oxygen and keeping the coal moist, alteration

and spontaneous combustion may be checked. A complete immersion would meet the requirements, but would only be practicable in rare cases. Wenzel Koech excludes the air and produces a uniform wetting of the stored piles of coal by admitting spent steam into them. For this purpose a series of trenches are cut in the ground; they are so covered with beams and boards that narrow spaces remain, not large enough to permit the coal to fall through. The boards are simply laid on cross-pieces, are not fastened, and can be easily removed for the purpose of cleaning out the trenches. On the ground thus prepared the coal is deposited in the usual way; the trenches are then connected with the exhaust-pipe of a steam-engine, and the steam admitted; it passes through the interstices in the covering into the coal-pile, disseminates itself through the latter, displaces the air, and, in consequence of the condensation of the steam, moistens the coal. In order to effect a uniform distribution of the steam it is necessary to cover the coal-pile with fine coal and cinders, as in the case of charcoal heaps, whereby strong draughts of air will be prevented from passing through the pile and interfering with the equal distribution of the steam. In the case of coal containing little pyrites careful covering of the coal is not so necessary, but it is of importance in the case of coal rich in pyrites. The distance apart of the trenches in large heaps of coal depends upon the sizes of the pieces of coal to be stored and the height of the pile; for medium-sized coal the distance between the trenches with a height of pile equal to 10 feet is 10 feet. The exhaust-steam of a steam-engine of 4-horse power, which worked but six hours during the day, was entirely sufficient for the preservation of a depot of 20 carloads of coal.

In carrying out the process it was repeatedly shown that the losses sustained in the unloading of the coal are far smaller than they are usually assumed to be, and that in this assumption a large portion of the waste produced by attrition was attributed to the destruction in dumping. In the loading of the coal preserved by steam it was found invariably that only in the locality where the first unloading took place, and where the coal fell from greater heights, attrition took place; the rest of the coal was good, was well preserved, and could be loaded without re-sorting. The cost of construction of the trenches and their covering—for which latter old and otherwise useless boards, timbers, and ties of the mine are utilized—for a dump of 100 carloads of coal amounts at most to $12.50. The cost of working is nothing, and the outlay consists only of the cost of preserving the trenches, and the interest and sinking fund on the capital invested.

Results relative to the use of this process have been obtained at several mines. At the Ferdinand shaft, belonging to the Austrian Coal Industry Association, confirmation of the described preservation method was quite accidentally found. Over a reservoir covered with *debris*, and into which exhaust-steam passed, coal had been deposited, which, on reloading, was found to be perfectly preserved. According to communications from mining engineer Hans Gutmann, further experiments were carried on with favorable results, and the working

of the process on a larger scale was proposed. The director of the Bruno mine uses old gratings to cover the canal. He also subjected coal, without covering with cinders, for more than two months to exhaust-steam, and found it in no way altered.

Shot-firing in Coal Mines.—Enquiries recently made by the English Government confirm the opinion that shot-firing is the source of most explosions; and it has been proposed to confine shot-firing to the time between shifts, and that during the progress of the blasting the shot firers only should be in the pits. This would prove undoubtedly a great safeguard, but in many mines the precaution would appear too great, so far as gas is concerned, provided that the preliminary examinations were properly conducted.

The effects of coal dust, however, must not be overlooked in this connection. The extension of gas explosions appears to be due in some instances to the almost impalpable dust of dry mines; and recent experiments at Koenig Colliery, near Saarbrucken, show that some coal dusts are capable by themselves of extending shot flames and producing considerable explosions.

At this colliery a drift was made, 167 feet long, in an old rock dump, timbered with double T iron, and lagged with two-inch plank. The drift was covered on all sides except the top, where thirty small bull's-eyes were inserted so that the drift could be examined during an explosion. The face of the drift was made of solid masonry into which seven small mortar guns were built. Two of these were near the roof and laid to strike the floor of the drift 33 feet from the face; three were placed in the middle of the face, so that they would hit the floor at a distance of 16 feet; the rest were placed near the floor.

A gun holding a charge of 8 oz. of powder, with clay tamping, was fired, and gave in the ordinary atmosphere a flame 10 feet long. The same charge, when tamped with fine coal, gave a flame 26 feet long.

When the floor of the drift was covered with a layer $1\frac{1}{8}$ inch in thickness of fine dry coal from the Union Colliery, the shots gave, with clay and coal tampings respectively, flames 18 feet and 31 feet long, showing that this coal dust did not appreciably affect the length of flame. When, however, a similar test was made with coal dust from the Pluto Colliery, where several explosions have taken place, flames were produced 190 feet long, and a strong explosive force developed. As the drift was entirely free from explosive gas the results of these experiments, which were many times repeated, would show that the manager of a dry coal mine should acquaint himself with the effect of blown-out shots on the dust of the mine under various conditions.

It will probably be found that there is some chemical rule of composition, or some state of aggregation, rendering certain coal dusts liable to ignition. The experiments should be extended to test the effect of different velocities of *air* in carrying coal dust, and trans-

mitting its flame; and to the comparison of the inflammability of fresh dust, and of that exposed to the atmosphere for some time.

Pit Ropes.—The following remarks taken from a paper recently read by Mr. R. I. Frechville, H. M. Inspector of Mines for Cornwall, will prove interesting to miners. He says:

Of all mining operations none is more important than that of winding, or has undergone more changes or improvements during the last quarter of a century, especially in the coal fields, where, in consequence of the increased depth and enormous output of the mines, great attention has been bestowed on this branch of mining engineering. In some instances from 1,000 to 1,500 tons of coal are drawn from a single pit in a day, the cages running at a speed in the shaft of from 1,500 to over 2,000 feet per minute. This result is due not only to the shafts being perpendicular, and powerful engines being employed, but also to the marked improvement of detail in the appliances used.

The rope to be used is a matter of the first importance, especially in those cases where the security of human life is dependent on its efficiency. The essentials of a good rope are flexibility and strength, combined with the least possible weight. Experience has shown that in the majority of cases these requirements are best fulfilled by round steel wire ropes. Iron wire ropes are fast going out of use, owing to the larger sizes required for given strengths, with consequent increase of dead weight to be subtracted from the useful load. It must, however, be borne in mind that, where the water contains much acid, the injurious effect of this on a steel wire rope would be greater than on an iron wire rope.

The physical properties of steel largely depend on the proportion of carbon combined with the iron, the addition of carbon increasing the hardness and ultimate strength, while the ductility and power of resistance to shock and sudden stress diminish. The softer kinds of steel, however, which contain least carbon, approach wrought-iron in character, having equal toughness, greater strength, and the same capacity for welding. The milder steels contain from 0.15 to 0.4 per cent of carbon, and the hardest from 1.4 to 1.6 per cent. The following are the breaking strains per square inch of wire of some of the most usual varieties employed in rope-making:

Mild steel	from	40	to	50	tons.
Best crucible steel	"	50	"	60	"
Best patent steel	"	70	"	80	"
Best plow steel	"	110	"	120	"

Too great stress cannot be laid upon the necessity of having ropes constructed of the best material. The selection of the material however, somewhat depends on the conditions of working. Thus, with a perpendicular shaft and large drums and pulleys, a plow-steel wire rope will be found the most reliable; but with small drums and pul-

leys, and a shaft with angles in it, a rope made of best patent steel or mild steel will last longer, as the wires are not so apt to snap in bending. In describing a wire rope, the number of strands, the number of wires in each strand, their gauge, the quality of metal, and the material of which the centre or core is composed, should be specified.

Now as to the gauge, since the ultimate strength of wire increases as its diameter decreases, and since small wires are more pliable than large ones, it would seem that the finer the wire used the better; but there is a practical limit to this, as very fine wire offers too much surface to oxidation, and is too easily injured by friction. Experience has shown that it is advisable to employ medium sized wires, between Nos. 10 and 15 of the Birmingham wire gauge. For ordinary work hemp cores or centres have been proved the best; they stretch with the strands, allow the wires to bed themselves solidly, and give ropes greater flexibility than could be obtained with wire centres. The latter have not given very satisfactory results in practice, although a greater breaking strain is obtained with a relatively smaller rope.

There are many modifications in the methods of laying or twisting the wires. Common laid rope has six strands with seven wires in each, the size of the wire being altered to suit the size of the rope. Compound ropes, that is, ropes with more wires in the strands than in the usual construction, in addition to other varieties, have six strands with 19 equal sized wires in each, or seven strands with 6 wires in the middle of about 15 gauge, and 12 round the outside, alternately 15 gauge and 12. Ropes with six strands of 11, 12, and 13 wires each are frequently manufactured. Some makers prefer the inner wires of each strand smaller, so as to be more flexible than the outer. Six strands in a rope are better than four or five, as they make it more cylindrical, and consequently the friction is better distributed. Six strands of 19 wires each make very durable ropes. These work better than one of equal size composed of 6 or 7 wires in a strand, as the latter, being larger and less pliable, are more liable to snap in passing round pulleys and drums. When three or four of these wires break near together the rope is hardly fit for work, whereas the breakage of small wires would be of much less consequence. More material can be got into the same sized rope when compound instead of common laid, as the smaller wires do not leave so much space between each other.

On account of the many different sizes of steel wire employed in the manufacture of rope, and the varying sizes of the hemp centres, and the empty spaces above referred to, it is impossible to state a formula for determining the dimensions of a steel wire rope to bear a given strain. As the nature of a wire rope, however, is defined by the number and size of the wires, it is easy, if we know the section and weight per fathom of the gauge employed, to determine the effective sectional area of the rope and its weight per fathom; given, then, the quality of the metal, the breaking strain of the rope can be approximately estimated.

The following table, in which the numbers of the Birmingham wire gauge most usually employed in the construction of mine ropes, are compared with inches, and the weight of a cubic foot of steel is taken at 487 pounds, will be found useful in these calculations:

No. B.W.G.	Diameter in inches.	Sectional Area in square inches.	Weight per fathom in pounds.
10	.137	.01474	.2990
11	.125	.01227	.2489
12	.109	.00983	.1893
13	.095	.00708	.1436
14	.083	.00541	.1097
15	.072	.00407	.0825

Thus in the case of a steel wire rope composed of six strands, 7 wires in each, of 10 gauge, the effective sectional area will be $6 \times 7 \times .01474 = .61908$ square inches, and its weight in metal, and its weight per fathom in metal $6 \times 7 \times .2990 = 12.55$ pounds. If best plow-steel wire with a breaking strain of 120 tons per square inch is employed in its manufacture, then .61908 the effective sectional area $\times$ 120 tons = 74.28 tons, and deducting $\frac{1}{8}$ for lay, we obtain 65 tons as about the breaking strain of the rope.

Again, let us suppose a compound rope made of the best patent steel wire with breaking strain of 75 tons per square inch, and composed of six strands of 19 wires each, 13 gauge. The following calculation—$6 \times 9 \times .00708$ sectional area of each wire by 75 tons breaking strain per square inch of wire, less $\frac{1}{8}$ per lay, gives us 52.97 tons as the approximate breaking strain of the rope. Such a rope, with hemp core and fairly made, would weigh about 18 pounds per fathom, and have a circumference of about $4\frac{1}{2}$ inches. The actual breaking strain, however, can only be found out by testing sample lengths of the finished ropes.

As the operations of manufacture introduce so many elements of uncertainty in wire ropes it is well to allow a wide margin of safety, especially where their breakage would endanger life, and to take the working load as one-tenth of the ultimate strength of the breaking strain. The weight of the rope hanging over the pulley at the poppet-heads is of course included in the working load. In very deep mines this weight, even with steel wire ropes, becomes a matter of such serious consideration that tapering ropes have to be used. In the case of a rope working at a very slow speed, such, for instance, as a capstan rope, a larger factor of safety than one-tenth may be adopted.

Since any extra strain on a rope leaves it weaker than it was before, on no account should a rope used for raising men be ever worked above a fair working load. Experiments made at some of the coal mines prove that, when the full cage is lifted from the bottom, about double the ordinary strain due to the load is produced. This arises from the inertia of the mass to be moved. In winding men, there

should be no resting-place for the cage; the engine should be started gently, driven regularly, and with a speed of only about two-thirds of what is otherwise usual. The rope also should be examined every twenty-four hours, and this should be done by winding it slowly through the operator's hands; if he does not happen to see the broken wires, in all probability he will feel them. Occasionally the rope should be thoroughly cleaned, and its condition more minutely ascertained. When broken wires are found, the longest may be tucked underneath and the others cut off to prevent their catching and doing further mischief. The most careful watch must be kept on the portion of the rope where they occur.

A new rope should be tested with several days' winding before men's lives are trusted to it. It is indispensable for the preservation of steel wire ropes that they should be greased regularly. The grease used should be perfectly free from acid, and be soft enough to work into the strands right through to the hemp core. It must not be of such a nature as to harden; for in that condition, it allows rust to form between it and the wire, so that a rope which appears to be well greased may be corroded to a sensible depth. A mixture of Stockholm or Archangel tar, a vegetable oil, and a little lime boiled together, is often recommended. In this county, the tar is mixed with tallow. These mixtures, however, form too stiff a grease, tend to hide defects, and render the thorough examination of the rope difficult. A mixture containing gas-tar is still more objectionable. Some of the heavy mineral oils, such, for instance, as the Russian, their specific gravity being higher than the American, possess sufficient viscosity to be used as a lubricant for wire ropes, and will, if tried, owing to their freedom from acid and to their power of assisting decomposition, be found to give satisfactory results. At the Wearmouth colliery, they have a patented apparatus, consisting of a pair of wire brushes for cleaning the ropes, and a pair of strong hair brushes, fed with lubricant from feeders above, for oiling them. Both sets of brushes revolve, being actuated by the travelling rope. It is claimed that this arrangement lubricates very thoroughly, and effects a great saving in oil and labor.

When a rope is used for winding men, the shackle should be cut off regularly every two or three months, the rope thoroughly examined, and the shackle reset. This is a point of vital importance for wire ropes. In order to arrive at economical results with wire ropes, accurate accounts should be kept of their working. By this means, the kind most suitable may be ascertained, and a considerable saving effected by using an article best adapted for the purpose. However well a rope may seem to be lasting, it should always be suspected as soon as its duration approaches the average that corresponds with the conditions under which it is working; it should, at any rate, cease to be used where human life depends on it.

Owing to trade competition, there is great danger of inferior metal being used in the manufacture of ropes, so that, when a new one is required, only the best makers should be applied to, and they should

be furnished with full information as to the conditions under which it has to work. There can be no greater false economy than choosing a cheap rope. When a rope is for the purpose of winding men, it would be advisable to have a sample piece of it (say a length of from 10 to 12 feet) tested before use, in order to see that the quality of the metal and the breaking strain are as represented.

At East Pool, to put on the shackle, the rope is first lashed around with copper wire about 8 inches from the end; the strands are next untwisted, and the wires turned back singly; some are cut off at different lengths, so as to make the requisite taper; while the whole is then bound around with copper wire. The shackle, being heated to redness, is, after the tapering end of the rope has been inserted, hammered down to fit it snug. A coupling is then screwed on, and the shackle brought as tight as possible on the rope. Finally, a steel punch is driven through, to make place for the rivets, which are put in and fastened in the same way as boiler-rivets. The rope end is manipulated at both South Frances and Wheal Sisters in very much the same way as described above, being made of a conical shape like the inside of the socket. It is then pulled back, and a round center-pin of steel driven up in the middle to wedge it. With the socket used at Wheal Sisters, each chain of the runner passes over a separate heater-pin: this is certainly safer. The comparative merits of these attachments have not been ascertained by testing; it is very desirable, however, that this should be done. In many of the coal mines, they use a shackle with hoops and rivets, which is fastened to the rope as follows: The end is untwisted for about six inches; it is then doubled to suit the length of the shackle, the loose end twined around the main rope, and the whole bound with hemp twine soaked in tar; rivets with countersunk heads are put through both ropes and the shackle; the hoops are next put on and driven home tight. This, though doubtless a very strong connection, is not suitable for passing over pulleys and rolls, as our shackles are required to do.

The screw-heater and swivel, with their pins, should be made of from $1\frac{1}{2}$ to $1\frac{5}{8}$-inch, the runner chains of from $\frac{5}{8}$ to $\frac{3}{4}$-inch, and the coupling-chains of from $\frac{1}{2}$ to $\frac{5}{8}$-inch best wrought-iron bar. The pins should be secured in their places by jam-nuts. There should be five coupling-chains—one at each corner of the cage and one attached to the center; the latter carries no weight, but hangs a little slack, and is provided, in case a corner one should break, in order to prevent the cage tipping to one side and jamming itself in the shaft. The links should be made as short as is consistent with easy play, and those at the extremities a little larger and stronger than the rest. Chains require frequent and careful examination, as the links may wear into each other without being detected if not well looked after; also, owing to shocks, jerks, and alternations of temperature they are subjected to when in work, the iron undergoes a change in structure, and gradually becomes hard, crystalline, and liable to snap, as is seen in the case of railroad wagon couplings, which often break short with a crystalline fracture, apparently having had very little wear.

So far as this district is concerned, some of the principal details connected with our winding appliances, and more especially the precautions to be observed in the selection and treatment of wire ropes, have now been breifly touched on. There still confronts us, however, this most important question: In those mines where the men ascend and descend by cages, what means should be adopted in order to avoid the consequences of the breakage of the winding rope?

An attempt has been made to deprive accidents of this nature of their serious character by the application of safety-catches to the cage. About thirty years ago, many different sorts were invented, and for some time were in general use in the collieries, but now you seldom meet with them. It is said that they are liable to come into action when not wanted, especially with quick winding and during the descent of the cage, thus introducing an extra source of danger.

Most of these catches depend on the action of a spring, which comes into play on the breakage of the rope, and forces against the guides either eccentric clutches or levers with sharp points; the weight of the cage then causes the clutches to grip the guides, or, in the case of the levers, the sharp points to penetrate into the wood.

Although there are instances of life having been saved by some of these contrivances, there are also some instances of their failing to act, as in the case of the rope breaking at the Duke Hardenburg colliery (Westphalia), on December 21st, 1882, when 25 men lost their lives. The rope broke just as the cage, fitted with safety-catches, reached the surface; but unfortunately, these did not come into operation.

There appears to be a very general dislike to trust to the action of a spring in such a wet and dirty place as a shaft, and it is also thought that the use of catches would have a tendency to introduce a want of attention to the condition of the rope, and to encourage an attempt to unduly increase its working life.

The following papers relating to the Geology and Mineralogy of Nova Scotia have been read during the past year:

BUDDEN, H. A.—"The Coal of Nova Scotia." Montreal: Meeting of the British Association.

GILPIN, E., JR.—"Notes on the Manganese Ores of Nova Scotia." Royal Society of Canada.
"Results of Past Experience in Gold Mining in Nova Scotia." Montreal: Meeting of the British Association.
"A comparison of the distinctinctive features of the Nova Scotia Coal Fields." *Ibid.*
"Notes on the DeBert Coal Field." N. S. Institute of Natural Science.
"Cape Breton Manganese." *Ibid.*

HONEYMAN, REV. D.—"Notes of a Microscopic and Polariscopic Examination of Nova Scotian Crystalline Rocks." *Ibid.*
"Glacial Distribution in Canada." Geologists' Association.

MURPHY, MARTIN, Prov. Engineer.—"On some Physical Features of Nova Scotia, with Notes on Glacial Action." N. S. Institute of Natural Science.

SELWYN, A. R. C., Director of Canadian Geological Survey.—"Sketch of Canadian Geology." Geo. Surv.

I have the honor to remain, Sir,

Your obedient servant,

EDWIN GILPIN, JR.,

Inspector of Mines.

LIST OF MINERAL LEASES (OTHER THAN GOLD).

No.	Lessee.	District.	Area, Sq. Miles.
	COPPER.		
	ANTIGONISH COUNTY.		
2	Ross, McKay, and others		1
	COLCHESTER COUNTY.		
	Moir, Wm. C., et al	Tatamagouche	$10\frac{1}{2}$
	CAPE BRETON COUNTY.		
See Lease 105	Burchell, J. E		1
" 106	Burchell, G. L., and others		1
" 95	Coxheath Mining Co		1
104	McKenzie, H. R., et al		1
94	McKenzie & McKim		1
	HALIFAX COUNTY.		
1	McClure, Chas. F	Gay's River	1
	IRON.		
	PICTOU COUNTY.		
44	Hudson, James	East River	1
43	Hudson, James	" "	1

Total area under lease .... square miles.

LIST OF MINERAL LEASES (OTHER THAN GOLD).—*Continued.*

No.	Lessee.	District.	Area, Sq. Miles.
	IRON.—(CONTINUED).		
	CAPE BRETON COUNTY.		
86	Brookman, S., et al	N. Side East Bay	1
91	Brookman, S. L.	East Bay	1
93	Brookman, S., et al	East Bay	1
102	C. L. Ingraham	" "	1
103	A. McKenzie, et al	" "	1
92	Matheson, D., et al.	" "	1
84	Protheroe, Pryse	Cow Bay	1
	INVERNESS COUNTY.		
16	Inverness C. I. & R. Co	Whycocomagh	1
	Total area under lease		$27\frac{1}{2}$ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		ANTIGONISH CO.				
1	McKinnon, et al		3			
		CUMBERLAND CO.				
13, 14, 15	Black, C. H. M		3			
21	Blight, James, et al		1			
47	Boston, C. M. Co		1		John Moffat	RiverHerbert
25	Campbell, Alex., et al		1			
	" " "		2			
32, 34	" "		4			
35, 48, 49. 50	Campbell, John		8			
31, 33, 37, 38, 40, 41, 45, 46	Campbell, W		1			
54	Cumberland C. M. Co	Chignecto	4	Working.	*Jas. Baird*	Maccan.
12 6, 7, 8, 44, 52, 55	Cumberland R'y & Coal Co.	Springhill	9	Working	R. G. Leckie *W. Hall*	Springhill.
17	Domville, James		3		E. N. Sharp	St. John, N.B.
	Joggins C. M. Association	Joggins	2	Working.	*P. McNaughton*	Joggins.
	Joggins C. M. Co	Cumberland	2			
20, 42	Macfarlane, A		2			
18, 19	Livesey, John		2			
5	Lawson C. M. Co	Maccan	1			
51, 53	Milner, Christopher		2			
1, 2, 3, 4	New York & Acadia Co	Scotia	4	Working.		Maccan.

16	Seaman, Gilbert		1	Working.	*M. Dunlop*	River Herbert
24	Shannon, S. L		2			
36, 39	Shannon, S.L. (in trust) et al		2			
22, 23, 28, 29, 30	Styles Mining Co. (Ltd)		5		J. S. Hickman	Amherst.
9	Victoria Coal Mining Co		2			
26, 27	Wright, John V		3			
			65			
		PICTOU CO.				
1	Acadia Coal Co	Fraser	1	Working.	H. S. Poole	Stellarton.
3	" "	Acadia	1	"	*J. Maxwell*	Westville.
42	" "	Pictou	4			
23	Allan, Sir Hugh, K't	Vale	3	Working.	J. B. Moore *John Greener*	New Glasgow Vale Colliery.
10	Gray, B. G., et al		1			
11	Halliburton, R. G., et al		1			
	Halifax Co'y, (Ltd)	Albion	4	Working.	S. Cunard & Co *J. Rutherford*	Halifax. Stellarton.
13, 14	Intercolonial Co'y		2			
12	" "	Drummond	1	Working.	Robert Simpson	Westville.
6	Kirby, Lewis R		1			
15, 30, 31	Merigomish Co'y		3			
25	Nova Scotia Co'y	Black Diamond	4		M. H. Angell	Westville.
24	Richey, M. H		1			
			27			

LIST OF COAL LEASES.—(CONTINUED).

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager.*	Postal Address.
		CAPE BRETON CO.				
3	Archibald, Blowers.......	Gowrie	1	Working.	Archibald & Co... *Chas. Archibald* .	North Sydney Cow Bay.
2	Archibald, Thomas D.....	"	1			
5, 28	Blockhouse Mining Co....	Blockhouse	2	Working.	R. Belloni	Cow Bay.
29	" *(sea area)*..	....	1			
72	Brookman, Samuel.......	....	1			
76, 77	" S., et al.......	....	2			
15	Caledonia, C. & R. Co.....	Caledonia.......	1	Working.	David McKeen....	Caledonia M's
31	" *(sea area)*..	....	1			
30	Campbell, Alex	....	1		T. D. Archibald...	North Sydney
8, 9	Halifax Coal & Iron Co...	Ontario	1½	Working.	*John Sutherland* ..	Pt. Caledonia.
87	Cossit, Geo. G	....	1			
	General Mining Association	Bridgeport	2		Rich. H. Brown .. Cunard & Morrow	Sydney Mines Halifax.
	" " " ...	Sydney.........	18	Working.	H. Mitchell	Bridgeport.
27	" " *(sea area)*..	"	4		*Joseph Simpson* .	Sydney Mines
	" " " ..	Lingan	13	Working.	*Donald Lynk*	Low Point.
38, 39	" " " ..	"	10			
10, 21	Gibson, John, et al......	....	2			
4, 12, 16	Glace Bay Mining Co.....	Glace Bay	3	Working.	E. P. Archbold .. Chas. Rigby	Halifax. Lt. Glace Bay.
75	Henry, W. A............	....	1			
22	Ingraham, J. L	Halfway	1			

6, 13, 18, 19	International Coal Co. Ltd.	International	4	Working.	*P. Johnstone*	Bridgeport.
71	Jennings, Edward		1			
47	LeCras & McInnes		1			
66	Merchants' Bank of Canada.	Gardener	2			
74	Moore & Moseley		$1\frac{1}{4}$			
101	McDonald, W. B		1			
52, 53	McLeod, Hugh		2			
88, 89, 90	Paint, Henry N., and others.		3			
83, 85	Protheroe, Pryse		2			
73, 82	Reid, Thos. S. *(sea area)*		2			
40, 41, 42	Ross, H. E., et al		3			
79	Ross, W. J., et al *(sea area)*		1			
43	South Head Coal Co	South Head	1			
32	Sword, Wm. *(sea area)*		3			
23, 25, 70	Sydney & Louisburg Coal &					
14, 24	R. R. Co., Ltd	Schooner Pond	10	Working.	F. C. Kimber.	Sydney.
49	" " "	Reserve			*W. Routledge.*	Reserve Mines
64, 65, 68	" " "	Lorway				
69	" " "	Emery				
54 to 63	Sydney C.M. Co. *(sea areas)*		10			
46	Toronto Coal Co	Collins	1			
67	Weatherbe & Kirby		1			
78	Weathe be, R. L. *(sea area)*		5			
96, 97, 98, 99, 100	Low Point, Barasois and Lingan Mining Co. Ltd		5			
	" "		2	Working.	D. Lynk.	Low Point.
			$128\frac{3}{4}$			

LIST OF COAL LEASES.—(Continued).

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		INVERNESS CO.				
5	Aylmer, John Evans Freke.	Cape Mabou.....	2			
8	Evans, Thomas	Chimney Corner.	1			
9	Evans, Thomas *(sea area)*.	....	1			
7, 12	Inverness C. I. & R. C	....	2		Alex. Wright. ..	Moncton.
13	McGregor, J. D	Port Hood	3			
4	Richey, M. H., et al	....	1			
11	Ross, W. J..............	Broad Cove	1			
6	Ross, H. E., et al, *(sea area)*	....	1			
14, 15	Smyth, Peter...........	....	2			
10	Tremaine, E. D., *(sea area)*	....	1			
17	McDonald, Hugh	....	1			
			16			
		RICHMOND CO.				
2	Victoria Oil and Mining Co.	Little River.....	1			
			1			
		VICTORIA CO.				
2	Kenny, T. E.............	New Campbellton	3			
3, 4, 5	Ross, William	Black Rock	5			
			8			

Total area under lease........................$245\frac{3}{4}$ square miles.

TABLE A.—COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		TOTALS.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter..........	58,077	49,549	103,428	80,378	46,557	8,376	....	....	208,062	138,303
2nd Quarter..........	74,744	71,643	133,943	109,421	156,640	126,851	....	....	365,327	307,915
3rd Quarter..........	73,396	69,619	150,683	156,027	239,574	260,955	....	....	463,653	486,601
4th Quarter..........	73,729	67,594	123,139	118,355	155,385	142,882	....	....	352,253	328,831
Total...............	279,946	258,405	511,193	464,181	598,156	539,064	....	....	1,389,295	1,261,650
1883	247,861	222,347	505,626	461,809	668,293	612,614	773	753	1,422,553	1,297,523
1882	243,284	218,349	480,953	446,137	641,151	585,568	423	125	1,365,811	1,250,179
1881	183,419	171,149	372,197	346,968	568,509	516,852	245	45	1,124,270	1,035,014

TABLE B.—COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Totals.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round.	Slack.	
Nova Scotia											
Land Sales....	24,977	29,670	116,187	86,230	2,099	7,312	....	....	143,263	123,212	266,475
Sea borne	4,279	576	41,825	18,538	153,210	8,147	....	....	199,314	27,261	226,575
Nova Scotia, total	29,256	30,246	158,012	104,768	155,309	15,459	....	....	342,577	150,473	493,050
New Brunswick	58,062	35,662	23,286	1,947	39,011	452	....	....	120,359	38,061	158,420
Newfoundland	....	....	2,143	930	82,605	538	....	....	84,748	1,468	86,216
P. E. Island	....	....	7,681	23,662	15,186	3,870	....	....	22,867	27,532	50,399
Quebec	68,516	35,727	138,283	1,651	143,630	8,975	....	....	350,429	46,353	396,782
West Indies...........	9	64	529	84	8,669	240	....	....	9,207	388	9,595
United States	156	707	269	818	12,571	49,994	....	....	12,996	51,519	64,515
Other Countries	....	....	106	12	2,229	326	....	....	2,335	338	2,673
Total............	155,999	102,406	330,309	133,872	459,210	79,854	....	....	945,518	316,132	1,261,650
1883	152,453	69,894	319,859	141,950	543,419	69,195	687	66	1,016,418	281,105	1,297,523
1882	151,281	67,068	329,350	116,787	522,325	63,245	125	....	1,003,079	247,100	1,250,179
1881	127,756	49,413	257,573	89,395	446,649	70,203	45	....	826,003	209,011	1,035,014

COAL.—Sales.

Markets.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1884.	Year 1883.
N. Scotia.						
Land Sales.	76,166	65,434	45,673	79,202	266,475	259,266
Sea borne..	4,775	53,899	92,115	75,786	226,575	212,061
N. Scotia—T'l	80,941	119,333	137,788	154,988	493,050	471,327
N. Brunswick	26,878	37,036	52,782	41,714	158,420	167,740
Newfl'd	1,170	16,479	41,024	27,543	86,216	61,678
P. E. Island..	....	11,200	26,661	12,538	50,399	48,088
Quebec	27,007	105,229	190,631	73,915	396,782	410,605
West Indies..	2,128	923	1,554	4,990	9,595	31,860
United States.	179	17,715	35,931	10,690	64,515	102,755
Other Countries ...	....	....	230	2,443	2,673	3,470
Total....	138,303	307,915	486,601	328,821	1,261,650	1,297,523
1883..	141,994	325,153	498,913	331,463	1,297,523	1,297,523
1882..	121,898	256,987	494,038	337,256	1,250,179	1,250,179

COAL.—General Statement.

1884.	Produce.	Sales.	Colliery Consumption.
1st Quarter...............tons	208,062	138,303	32,671
2nd Quarter.............. "	365,32[illegible]	307,915	26,084
3rd Quarter.............. "	463,65[illegible]	486,601	26,284
4th Quarter.............. "	352,25[illegible]	328,831	31,730
Total..........	1,389,295	1,261,650	116,769
1883..................	1,422,553	1,297,523	111,949
1882..................	1,365,811	1,250,179	111,381
1881..................	1,124,270	1,035,114	107,888

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31st, 1884.

Collieries.	Seams.	Produce.	Sales.				Colliery Consumption.		
			Paying Royalty.	Free.	Total.	Per cent.	Engines.	Workmen.	Per cent.
Cumberland County.									
Chignecto	North Seam	11,644	8,358	1,343	9,701	84	1,780	349	18
Joggins	Joggins	25,034	19,795	2,994	22,789	92	1,326	297	6
Maccan	....	....	....	....	....	....	....	....	....
Milner	....	155	48	20	68	44	....	....	....
Minudie	....	10,023	7,722	1,736	9,458	94	460	182	6
Scotia	North Seam and Main	609	463	93	556	91	....	13	....
Springhill	Black and South	232,481	119,613	96,220	215,833	93	11,127	2,888	6
Pictou County.									
Acadia	Acadia Seam	115,451	69,114	38,475	107,589	94	5,893	2,191	7
Albion	Third and McGregor	201,557	120,513	54,688	175,201	86	10,052	4,462	7
Intercolonial	Acadia	120,656	82,360	30,334	112,694	93	6,060	3,182	7
Vale	McBean and Greener	73,529	58,322	10,375	68,697	92	9,744	1,140	15
Cape Breton County.									
Barasois	Lingan Main Seam	76	76	....	76	100	....	....	....
Blockhouse	Blockhouse	23,668	19,583	2	19,585	82	2,658	1,485	17
Bridgeport	Phelan	3,115	3,009	36	3,045	97	38	55	3
Caledonia	Phelan	69,461	49,054	16,386	65,440	94	937	1,094	2
Glace Bay	Harbor	36,138	29,483	3,270	32,753	91	1,600	1,994	9
Gowrie	McAulay	89,384	66,362	15,978	82,340	92	2,321	1,606	4
Ingraham	....	200	90	....	90	45	....	30	15
International	Harbor	87,216	69,339	11,459	8 ,798	93	3,600	1,528	4
Lingan	Lingan	23,404	20,061	.810	20,871	81	1,916	1,391	14
Ontario	Phelan	5,890	5,345	370	5,715	97	598	443	17
Reserve	Phelan	96,114	71,088	15,462	86,550	90	3,226	2,794	6
Sydney	Sydney Main	149,378	116,273	15,120	131,393	85	15,610	7,776	15
Victoria	Victoria	14,112	9,447	961	10,408	73	2,223	700	20
		1,389,295	945,518	316,132	1,261,650	....	81,169	35,600	....

COLLIERY CONSTRUCTION ACCOUNT.—1884.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery	Colliery Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospecting.	Total.
CUMBERLAND CO.											
Chignecto	$120 00	617 00	410 00	......	......	......	......	......	......	......	1147 00
Joggins	......	......	......	......	200 00	......	......	......	......	......	200 00
Maccan	150 00	500 00	200 00	600 00	200 00	250 00	250 00	......	......	260 00	2410 00
Milner	......	......	......	......	......	......	......	......	......	......	......
Minudie	......	......	125 00	1200 00	500 00	2300 00	......	......	200 00	......	4325 00
Spring Hill	......	6371 00	......	7329 00	100 00	880 00	1478 00	......	......	......	16158 00
Scotia	......	460 00	184 00	......	......	......	......	......	......	......	644 00
PICTOU CO.											
Acadia	......	......	......	5904 00	......	......	......	......	......	......	5904 00
Albion	......	......	......	......	......	......	......	......	......	......	
Intercolonial	......	......	......	10526 00	414 00	......	......	......	......	......	10940 00
Vale	......	4600 00	......	......	......	......	500 00	......	......	......	5100 00
CAPE BRETON CO.											
Barasois	......	655 00	......	75 00	120 00	......	94 00	......	......	......	944 00
Block House	......	......	......	......	......	......	......	......	......	......	
Bridgeport	78 00	......	92 00	160 00	90 00	1880 00	10 00	1800 00	200 00	......	4310 00
Caledonia	......	......	842 00	......	......	1100 00	......	1340 00	7117 00	......	10399 00
Glace Bay	......	......	154 00	......	......	......	......	......	......	......	154 00
Ingraham	114 00	......	......	......	50 00	......	......	......	......	435 00	599 00
Gowrie	......	......	1970 00	......	......	......	......	......	......	......	1970 00
International	......	......	......	......	1057 00	......	......	......	......	......	1057 00
Lingan	......	......	837 00	......	......	......	......	......	......	......	837 00
Ontario	......	......	23 00	100 00	......	......	......	......	......	......	123 00
Reserve	......	327 00	596 00	2971 00	3123 00	673 00	416 00	142 00	......	......	8248 00
Sydney Mines	......	......	......	......	491 00	889 00	......	......	......	......	1380 00
Victoria	......	5730 00	5832 00	1852 00	260 00	1420 00	870 00	1120 00	3035 00	......	20119 00
Total	462 00	19260 00	11265 00	30717 00	6605 00	9392 00	3618 00	4402 00	10552 00	695 00	96968 00

Statement of the Number and Classes of Men employed, and average results of each Colliery, during the year ended December 31st, 1884.

COLLIERIES.	Underground.				Surface.				Construction.		Total.		Average No. of Days per Person.		Average No. of tons per Cutter.	Average tons per day per Cutter.	Average quantity raised per day, Tons.	Horses.		Pits Worked
	Skilled Laborers.	Laborers.	Boys.	Days' Labor.	Mechanics.	Laborers.	Boys.	Days' Labor.	Persons.	Days' Labor.	Persons.	Days' Labor.	Under ground.	Surface.				Above.	Below.	Days.
Cumberland Co.																				
Chignecto	23	6	7	7126	5	8	2	4557	....	....	51	11683	197	303	506	5	136	1	2	85
Joggins	50	..	11	11113	13	20	5	9043	3	79	102	20235	182	237	500	2	122	3	2	205
Minudie	22	4	1	5101	5	9	3	4195	3	698	47	9994	188	246	455	1	40	2	....	249
Scotia	....	..	..	....	..	..	..	....	....	....	....	....	.....	.....	.....	.....	.....	....	....	....
Spring Hill	275	129	86	396801	46	83	15	35424	28	7421	662	439646	809	246	845	2	873	17	13	266
Pictou Co.																				
Acadia	88	81	25	47611	26	39	8	14806	....	26	261	62443	245	220	1211	4	467	5	5	247
Albion	256	139	68	195397	76	126	40	72913	....	....	705	268310	422	301	787	2	730	16	15	276
Intercolonial	135	52	73	61770	35	60	10	27706	6	1698	371	91174	237	263	893	3	492	8	13	245
Vale	148	47	15	46637	40	45	7	31432	....	....	302	78069	222	341	496	1	245	7	5	299
Cape Breton Co.																				
Block House	40	5	20	8587	17	26	5	12511	....	....	113	21098	132	260	591	4	164	10	9	144
Bridgeport	7	..	1	1602	1	9	2	1832	12	1728	32	5162	200	152	445	4	34	1	....	90
Caledonia	87	5	23	20183	10	22	8	10255	18	5143	173	35581	175	256	798	5	460	14	7	151
Glace Bay	82	7	14	11510	28	26	3	14040	....	....	160	25550	111	246	443	2	228	3	2	158
Gowrie	91	11	31	29293	17	36	12	16760	....	....	198	46053	220	257	982	5	538	8	15	166
Ingraham	2	..	..	220	1	..	..	210	4	1295	7	1725	110	210	100	2	5	....	....	40
International	349	83	115	38534	73	153	10	24269	14	360	797	63163	70	102	249	2	855	4	28	102
Lingan	48	6	12	14117	2	25	7	8108	....	....	100	22225	213	238	487	3	149	3	4	157
Ontario	15	2	3	2783	6	5	3	2578	....	....	34	5361	139	184	392	......	......	1	2	....
Reserve	128	16	37	32872	19	25	8	13278	29	8118	262	54268	420	255	782	4	513	7	16	187
Sydney	211	34	81	76134	63	97	31	52766	....	....	517	128900	233	276	707	4	913	15	29	164
Victoria	33	23	2	14041	11	28	2	12831	20	6076	119	32948	242	312	427	1	46	3	1	309
	2090	650	625	1021432	488	852	181	369514	127	32642	5013	1423588	238	245	563	2	......	128	168	196

Nova Scotia Coal Sales, from 1785 to 1884 (inclusive).

Year	Sales.	Total.
1785	1,668	
1786	2,000	
1787 1788 1789 1790	10,681	14,349
1791	2,670	
1792	2,143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	70,452
1811	8,516	
1812	9,570	
1813	9,744	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	91,527
1821	11,388	
1822	7,512	
1823 1824 1825	27,000	
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	140,820
1831	37,170	
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145,962	
1840	101,198	839,981

Year.	Sales.	Total.
1841	148,298	Forw'd 1,208,177
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	2,399,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576,935	
1865	635,586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	4,927,339
1871	596,418	
1872	785,914	
1873	881,106	
1874	749,127	
1875	706,795	
1876	634,207	
1877	697,065	
1878	693,511	
1879	688,628	
1880	954,659	7,377,428
1881	1,035,014	
1882	1,250,179	
1883	1,297,523	
1884	1,261,650	4,844,366
	Total....	22,290,937

SUMMARY.

1785 to 1790	14,349	1831 to 1840	839,981
1791 to 1800	51,048	1841 to 1850	1,533,798
1801 to 1810	70,452	1851 to 1860	2,399,829
1811 to 1820	91,527	1861 to 1870	4,927,339
1821 to 1830	140,820	1871 to 1880	7,377,428

COAL.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	118,173	24 ad.	1868	228,132	$1.25
1851	116,274	"	1869	257,485	"
1852	87,542	"	1870	168,180	"
1853	120,764	"	1871	165,431	"
1854	139,125	Free	1872	154,092	.75
1855	103,222	"	1873	264,760	"
1856	126,152	"	1874	138,335	"
1857	123,335	"	1875	89,746	"
1858	186,743	"	1876	71,634	"
1859	122,720	"	1877	118,216	"
1860	149,289	"	1878	88,495	"
1861	204,457	"	1879	51,641	"
1862	192,612	"	1880	123,423	"
1863	282,775	"	1881	113,728	"
1864	347,594	"	1882	99,302	"
1865	465,194	"	1883	102,755	"
1866	404,252	"	1884	64,515	"
1867	338,492	$1.25			

NOTE.—The quantities given for the years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably under estimated.

GOLD.—GENERAL STATEMENT FOR THE YEAR 1884.

Shewing the number of Mines, Days' Labor performed, quantities of Quartz crushed, yield of Gold, &c., for the year ended December 31st, 1884.

DISTRICTS.	Number of Mines.	Days' Labor.	Mills Employed.	Steam Power.	Water Power.	Tons of Quartz, &c. Crushed.	Yield per Ton.			Maximum Yield per Ton.			Total Yield of Gold			Average yield per man per day for twelve months at $18.00 per ounce.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou	3	7499	2	1	1	1559	0	12	9	2	10	0	966	19	22	2.32
Darr's Hill..............	1	24935	1	....	1	9799	0	6	20	0	9	14	3397	0	0	2.45
Fifteen Mile Stream......	1	1573	1	....	1	107	0	16	13	1	5	21	88	14	3	1.00
Montagu................	2	4469	2	2	....	539	1	7	8	4	6	0	736	12	23	2.90
Oldham	2	3011	2	1	1	921	0	17	21	2	3	12	824	15	12	4.80
Renfrew................	1	3170	1	....	1	1679	0	6	18	1	0	0	569	18	0	3.20
Sherbrooke	8	22142	2	1	1	3268	0	16	7	6	14	12	2668	11	0	2.10
Stormont	1	7337	1	1	....	913	2	8	10	3	17	5	2212	8	1	5.40
Tangier	1	13589	2	2	....	1330	0	14	0	0	18	18	924	2	19	1.10
Uniacke	2	4898	4	3	1	2235	0	19	4	1	4	5	1140	6	2	4.20
Waverly................	1	344	2	1	1	10	1	7	0	1	7	0	1	7	0	....
Unproclaimed, &c.........	4	25120	7	3	4	2826	0	18	0	5	0	0	2548	19	0	1.80
Total..........	27	118087	27	15	12	25186	0	12	18	6	14	12	16079	14	10	2.40

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

Month.	Carribou. No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	Darr's Hill. No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	Fourteen Mile Stream. No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	2	220	9	23	30	15	0	1	1650	66	780	247	10	0	1	95	4	41	20	2	2
February	3	550	22	75	78	12	0	1	1900	76	625	224	0	0	1	75	3	....	..	..	..
March	3	695	28	125	84	..	..	1	2264	90	600	209	0	0	1	40	2	....	..	..	..
April	3	455	18	227	67	4	18	1	2259	90	700	245	0	0	1	115	5	....	..	..	..
May	3	587	23	251	61	3	23	1	1425	57	756	298	10	0	1	126	5	....	..	..	..
June	4	737	30	109	38	17	10	1	1960	78	988	263	0	0	1	89	3	....	..	..	..
July	3	709	28	127	116	1	4	1	2207	88	900	215	0	0	1	155	6	....	..	..	..
August	2	581	23	62	27	2	16	1	2300	90	900	275	0	0	1	167	6	11	14	5	0
September	3	816	32	101	67	16	0	1	1750	70	950	485	0	0	1	197	7	....	..	..	..
October	3	674	27	87	100	5	0	1	2260	90	950	328	0	0	1	283	11	27	26	0	0
November	2	813	32	255	212	2	16	1	2490	100	915	254	0	0	2	201	8	28	28	7	1
December	2	662	26	117	82	19	7	1	2470	98	735	353	0	0	2	30	2	....	..	..	..
	3	7499	...	1559	966	19	22	1	24935	...	9799	3397	0	0	1	1573	....	107	88	14	3

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month.	Montagu.							Oldham.							Renfrew.						
	No. of Mines.	Days' Labor	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	2	204	8	....	..	..	..	2	433	17	44	43	7	18	1	....	....	125	35	14	0
February	2	189	7	40	42	7	0	2	303	14	101	112	5	16	1	....	....	120	3	16	0
March	1	332	13	18	9	1	6	2	214	9	53	52	16	0	1	....	....	208	56	12	0
April	1	228	9	71	8	8	0	2	205	8	46	53	0	12	1	....	....	....	..	..	..
May	1	317	12	43	5	9	0	3	269	11	88	63	13	2	1	....	....	280	87	3	0
June	2	369	14	....	..	..	..	3	357	14	97	66	7	6	1	....	....	216	98	14	0
July	2	381	15	46	4	17	17	2	212	8	86	77	8	0	2	625	25	137	58	12	0
August	2	749	30	24	42	8	0	3	185	7	99	76	10	11	2	710	30	....	..	..	..
September	2	1059	42	53	227	18	0	2	195	4	32	11	15	4	2	690	28	....	..	..	..
October	1	260	10	86	115	13	0	2	50	2	20	9	3	7	2	327	13	....	..	..	..
November	1	252	10	88	137	7	0	2	236	10	133	148	8	14	2	359	14	200	77	6	0
December	1	129	5	70	143	4	0	2	352	14	121	109	19	18	2	459	18	393	152	1	0
Totals	1	4469	...	539	736	12	23	2	3011	...	920	824	15	12	1	3170	....	1679	569	18	0

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

MONTH.	SHERBROOKE.							STORMONT.							TANGIER.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	7	2268	91	500	252	9	0	1	675	27	64	208	3	0	2	1034	41	200	179	6	0
February	7	2050	82	282	193	17	0	1	630	25	65	229	10	0	2	391	16	40	12	2	0
March	8	1976	79	269	380	4	0	1	720	29	71	163	4	0	2	1635	65	223	172	5	18
April.	6	1944	78	172	349	15	0	1	680	27	75	181	10	0	2	1093	44	10	6	6	12
May	8	2079	82	206	224	2	0	1	585	23	75	197	7	0	2	862	34	115	108	0	0
June	10	2100	84	195	285	11	0	1	572	23	65	151	10	0	2	1097	44	78	53	17	15
July	9	1890	76	261	238	13	0	1	605	24	97	172	4	0	1	1369	54	....	..	..	..
August	9	1560	62	339	213	3	0	1	560	22	72	149	17	0	1	1290	51	224	138	10	0
September	9	1352	54	329	99	10	0	1	585	23	47	182	10	0	1	1447	60	125	74	0	0
October	10	1728	69	281	100	11	0	1	619	25	113	168	11	20	1	1381	55	147	74	5	0
November	9	1575	63	205	157	15	0	1	598	24	71	185	15	0	1	916	36	124	77	16	5
December	6	1620	65	229	173	1	0	1	508	20	98	222	6	5	1	1074	43	44	27	13	17
Totals........	8	22142	....	3268	2668	11	0	1	7337	...	913	2212	8	1	1	13589	...	1330	924	2	1

MONTHLY STATEMENT FROM EACH GOLD DISTRICT—(CONTINUED).

Month.	Uniacke.							Waverly.							Unproclaimed.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	3	499	20	222	135	18	10	1	48	..	....	..	..	..	3	1547	62	192	203	18	0
February	3	441	20	85	75	7	10	1	34	..	....	..	..	..	3	1561	62	183	191	11	0
March	4	626	25	333	131	15	6	1	74	..	....	..	..	..	3	1276	51	233	162	19	0
April	2	345	13	175	114	0	5	..	......	..	....	..	..	..	4	2076	83	197	177	12	0
May	2	392	16	187	116	2	19	1	12	..	....	..	..	..	4	2486	99	112	91	12	0
June	2	320	12	206	53	11	18	1	32	..	....	..	..	..	4	2636	105	208	192	15	0
July	2	275	11	148	65	14	15	1	8	..	....	..	..	..	3	2135	85	227	201	19	0
August	3	418	16	275	110	11	10	2	71	..	10	1	7	0	3	2095	83	229	252	0	0
September	3	482	20	147	128	10	20	2	75	..	....	..	..	..	3	2112	84	273	170	4	0
October	3	440	19	142	68	4	18	..	......	..	....	..	..	..	5	2292	91	307	148	5	0
November	2	350	14	238	107	2	23	..	......	..	....	..	..	..	5	2444	99	366	388	19	0
December	3	310	11	77	33	5	16	..	......	..	....	..	..	..	5	2460	99	299	361	5	0
	2	4898	...	2235	1140	6	2	1	344	..	10	1	7	0	4	25120	....	2826	2548	19	0

GOLD.

GENERAL ANNUAL SUMMARY.

YEAR.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2,000 lbs.			Total Days' Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A day.	A year.
1862	7,275			6,473	1	2	11	156,000	$ 83	$249
1863	14,001	14	17	17,002		16	11	273,264	92	276
1864	20,022	18	13	21,434		18	16	252,720	1 42	426
1865	25,454	4	8	24,423	1	0	20	212,966	2 15	645
1866	25,204	13	2	32,161		15	2	211,796	2 14	642
1867	27,314	11	11	31,386		17	9	218,894	2 24	672
1868	20,541	6	10	32,262		12	17	241,462	1 53	459
1869	17,868	0	19	35,147		10	4	210,938	1 52	456
1870	19,866	5	5	30,829		12	21	173,680	2 05	615
1871	19,227	7	4	30,791		12	11	162,992	2 12	636
1872	13,094	17	6	17,093		15	7	112,476	2 09	627
1873	11,852	7	19	17,708		13	9	93,570	2 28	684
1874	9,140	13	9	13,844		13	5	77,246	2 12	636
1875	11,208	14	19	14,810		15	4	91,698	2 20	660
1876	12,038	13	18	15,490		15	13	111,304	1 94	582
1877	16,882	6	1	17,369		19	10	123,565	2 46	738
1878	12,577	1	22	17,990		13	23	110,422	2 05	615
1879	13,801	8	10	15,936		17	8	92,002	2 34	702
1880	13,234	0	4	14,037		18	20	103,826	2 18	654
1881	10,756	13	2	15,556		12	20	126,308	1 52	456
1882	14,107	3	20	22,081		12	18	106,884	2 37	711
1883	15,446	9	23	25,954		10	21	97,733	2 84	862
1884	16,059	18	17	25,147		12	18	118,087	2 40	720
Total.	366,976	11	19	495,923	....			3,480,193	....	......

INTERCOLONIAL RAILWAY.

Statement shewing the quantities, in tons, of the different kinds of Coal received from the various Mines for the use of the Intercolonial Railway, during the year 1884.

Month.	Acadia.	Albion.			Chignecto.	Drummond.	Joggins.	Spring Hill.			Vale.
		Round.	Small.	Coke.				Round.	Run of Mine.	Nnt.	
January	...	2004	200	...	2054	...	...	8041	...	...	...
February	...	2382	45	8	2798	...	...	8108	...	...	210
March	32	2296	31	...	837	93	...	5557	16	27	...
April	11	3160	73	...	...	...	...	2751	6427	28	15
May	...	1567	98	...	...	...	...	...	6530	...	...
June	...	1354	35	20	...	...	...	91	8207	...	...
July	11	1317	112	...	...	...	40	108	5749	...	3296
August	...	1048	151	...	...	...	...	54	5484	...	5511
September	...	594	53	...	...	...	...	140	1273	...	5338
October	...	3016	165	...	...	...	...	79	1978	...	7309
November	...	4505	21	14	...	...	...	403	4638	...	5929
December	42	4145	24	...	...	...	...	5	2711	...	6258
	96	27388	1008	42	5689	93	40	25337	43013	55	33866

INTERCOLONIAL RAILWAY.

STATEMENT, shewing the number of tons of Coal received at the following Stations from Mines in Nova Scotia for the year ending the 31st December, 1884.

STATIONS.	No. Tons.	STATIONS.	No. Tons.
Halifax	57480	Bic	4
Bedford	458	Nappan	50
Windsor Junction	4830	Amherst	3631
Wellington	76	Aulac	240
Enfield	294	Sackville	1871
Elmsdale	158	Dorchester	1057
Milford	41	Memramcook	475
Shubenacadie	330	Painsec	8
Stewiacke	516	Shediac	268
Brookfield	108	Point du Chene	16
Truro	6930	Moncton	14612
Valley	32	Salisbury	1844
Riversdale	6	Petitcodiac	105
West River	24	Penobsquis	1666
Hopewell	1470	Sussex	520
New Glasgow	20729	Apohaqui	6
Pictou Landing	43482	Norton	38
Belmont	35	Passakeag	26
De Bert	6	Hampton	713
East Mines	48	Rothesay	156
Londonderry	77140	Cold Brook	3941
Wentworth	73	St. John	15295
Greenville	40	Berry's Mills	26
Thompson	6	Weldford	48
Oxford	407	Kent Junction	235
River Philip	19	Chatham Junction	205
Athol	4	Derby	28
Maccan	90	Newcastle	110
Bathurst	136	St. Simon	4
Petit Roche	8	River du Loup	117
Jacquet River	10	Ste. Helene	24
New Mills	37	St. Philippe	10
Charlo	16	Ste. Anne	4
Dalhousie	79	St. Roche	44
Campbellton	322	St. Jean, P. Joli	12
Cedar Hall	85	Cape St. Ignace	10
St. Octave	12	St. Charles Junction	35
Ste. Flavie	35	Chaudiere (Local)	39596
Ste. Luce	30	" (Points West)	58040
Rimouski	91	Point Levi	15262
			376049

From the following Stations:

STATIONS.	No. Tons.
Drummond	41373
Hopewell	10548
Stellarton	146888
New Glasgow	26096
Spring Hill	148155
Maccan	2989
Total	376049

MINERALS OTHER THAN THOSE LEASED FROM THE CROWN.

† GYPSUM.

Windsor	Tons.	80,072	Value	$80,072
Cheverie	"	23,177	"	16,401
Walton	"	4,304	"	3,456
Hantsport	"	350	"	350
St. Ann's, C. B............	"	2,795	"	2,795
Arichat, "	"	370	"	370
	"	111,068		$103,444

† BUILDING STONE.

Pictou	Tons.	170	Value	$1,530
Pugwash	"	580	"	
Antigonish	"	30	"	120
	"	720		

† MANGANESE.

Tenny Cape..............	Tons.	126	Value	
Windsor	"	$5\frac{1}{2}$	"	550
Cheverie	"	2	"	180
Walton	"	$89\frac{1}{4}$	"	8,430
East Mountain, Colchester Co	"	30	"	2,700
Loch Lomond, C. B	"	50	"	
	"	$302\frac{3}{4}$		

GRINDSTONES, ETC.

Lower Cove / A. Seaman & Co	Grindstones	Tons.	2,200	Value	$26,400
	Scythestones	Boxes.	2,000	"	2,000
					$28,400

LIMESTONE.

†Pugwash	Tons.	301	Value	$300
†St. Peters	"	4,267	"	
‡Londonderry (ankerite)	"	5,799	"	
‡Brookfield	"	15,000 ?	"	
		25,567		

ANTIMONY.

†Rawdon Mine........... Tons. 600

MOULDING SAND.

†Windsor .... Tons. 175 Value $265

COPPER ORE.

Coxheath................ 110 Tons.

IRON MINING.

Londonderry..54,885 tons

AVERAGE FORCE EMPLOYED DAILY.

		Days Worked.
Skilled workmen:		
Under-ground	83	20,970
Above-ground	19	5,774
Unskilled labor:		
Above-ground	28	7,236
Under-ground	86	19,447
Total	216	53,427

†Amounts exported. The home consumption of Gypsum, Limestone, Moulding Sand, and Building Stone being unknown.
‡Used as flux.

EXPORTS FROM HALIFAX.

Produce of the Mine year ending Dec. 31, 1884.

		Quantity.	Value.
Gold		....	$307,135
Antimony.....................	Tons.	463	17,865
Oil Coal	Gals.	1,978	372
Salt..........................	Bush.	39,421	8,515
Other Minerals		....	1,689
			$335,574

FINANCIAL STATEMENT.—GOLD, &c.

Mines Department for Twelve Months ended 31st December, 1884.

DISTRICTS.	RECEIPTS.			EXPENDITURE.				
	Rents.	Royalty.	Total.	Return Rents.	Royalty.	Royalty Commiss'n.	Salaries and Surveys.	Total.
Caribou	$ 24 00	$ 353 40	$ 377 40	$	$	$ 16 45	$	$ 16 45
Darr's Hill		1148 22	1148 22					
Fifteen Mile Stream	24 00	150 52	174 52		144 38	31	25 50	170 19
Gay's River	4 00		4 00					
Lawrencetown		82	82					
Montagu	70 00	209 90	279 90				7 50	7 50
Oldham	60 00	305 49	365 49			16 58	28 00	44 58
Ovens	18 00		18 00	2 00			127 00	129 00
Renfrew	20 00	36 52	56 52			1 83	89 00	90 83
Sherbrooke	34 00	981 77	1015 77			52 00	399 99	451 99
Stormont	112 00	922 93	1034 93			46 14		46 14
Tangier	59 00	469 42	528 42			10 40		10 40
Uniacke	20 00	766 82	786 82			2 50	130 00	132 50
Waverly	270 00	27	270 27				4 00	4 00
Wine Harbor	24 00		24 00					
Unproclaimed	1384 00	1370 09	2754 09	20 00	882 52	17 15	567 87	1487 54
Prospecting Licenses			2547 99					210 00*
	$ 2123 00	$6716 17	$11387 16	$22 00	1026 90	163 36	1378 86	$ 2801 12

* Return.

OTHER THAN GOLD.

Mines Department for twelve months ended 31st December, 1884.

COUNTIES.	RECEIPTS.				EXPENDITURE.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Ret'rn Licenses to Search.	Salaries and Surveys.	Totals.
Annapolis	$ 40 00	$ 50 00	....	$ 90 00	....	....	....
Antigonish	200 00	50 00	....	250 00	....	....	....
Cape Breton	200 00	125 00	$52657 74	52982 74	....	$1024 15	$ 1024 15
Colchester	80 00	....	....	80 00	....	....	....
Cumberland	360 00	200 00	1013 81	1573 81	....	730 00	730 00
Digby	40 00	....	....	40 00	....	....	....
Guysborough	40 00	....	....	40 00	....	....	....
Halifax	40 00	....	....	40 00	....	....	....
Hants	80 00	....	....	80 00	....	....	....
Inverness	240 00	50 00	....	290 00	$ 20 00	....	20 00
Kings	20 00	....	....	20 00	....	....	....
Pictou	420 00	475 00	32605 65	33500 65	20 00	25 00	45 00
Richmond	100 00	100 00	....	200 00	....	....	....
Victoria	60 00	....	....	60 00	20 00	....	20 00
Yarmouth	20 00	....	....	20 00	....	....	....
Examinations	....	....	....	24 00	....	....	92 63
	1940 00	1050 00	86277 20	89291 20	60 00	1779 15	1931 78

ABSTRACT ACCOUNT.

Receipts and Expenditure for the Twelve Months ended 31st December, 1884.

RECEIPTS.		
Licenses to Search	$1940 00	
" " Work	1050 00	
Royalty	86277 20	
Examinations	24 00	
		$89291 20
Rents	$2123 00	
Royalty	6716 17	
Prospecting Licenses	2547 99	
		$11387 16
		$100678 36

EXPENDITURE.		
Return Licenses to Search	$60 00	
Salaries and Surveys	1779 15	
Examinations	92 63	
		$1931 78
Return Rents	$22 00	
" Royalty	1026 90	
Royalty Commission	163 36	
Salaries and Surveys	1378 86	
Return Prospecting Licenses	210 00	
		$2801 12
General Expenses	$5634 62	
Postage	70 31	
Stationery and Printing	251 85	
		$5956 78
		$10689 68

REPORT

OF THE

DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR 1885.

HALIFAX, N. S.:
COMMISSIONER OF PUBLIC WORKS AND MINES, QUEEN'S PRINTER.
1886.

CONTENTS.

DEPARTMENT OF MINES.

REPORT FOR THE YEAR 1885.

To His Honor Matthew H. Richey, Esq., Lieutenant-Governor of the Province of Nova Scotia, &c., &c., &c.

MAY IT PLEASE YOUR HONOR,—

I respectfully present herewith to Your Honor the Annual Report of the Inspector of Mines, containing an account of the mineral resources of the Province, and the progress of mining operations, together with statistical information compiled by him from official and other returns.

I remain,

Your Honor's obed't servant,

CHARLES E. CHURCH,

Commissioner of Public Works and Mines.

HALIFAX, February 16th, 1886.

REPORT

ON THE

MINES OF NOVA SCOTIA,

By EDWIN GILPIN, Jr., A.M., F.G.S., F.R.S.C.,

INSPECTOR OF MINES.

(Member of the North of England and the American Institutes of Mining Engineers.)

OFFICE OF INSPECTOR OF MINES,
HALIFAX, February 15th, 1886.

TO THE HONORABLE
CHARLES E. CHURCH, M. P. P., M. E. C.,
Commissioner of Public Works and Mines.

SIR,—I beg leave to submit the following report on the Mines and Mineral resources of Nova Scotia, and the progress of mining during the year 1885.

The following summary shows, so far as I have been able to learn, the mineral production of Nova Scotia during the year 1885, compared with that of the previous year:

		1884.	1885.
Gold	Ounces	16,079	22,203
Iron Ore	Tons	54,885	48,129
Manganese Ore	"	302	353½
Copper "	"	110	
Lead "	"	100	
Barytes "	"		300
Antimony "	"	600	*758
Coal raised	"	1,389,295	1,352,205
Gypsum	"	111,068	87,644
Building stone	"	780	3,827
Coke made	"	40,085	30,185
Limestone	"	25,567	16,429
Grindstones, etc.	"	2,200	2,208

* Amount exported.

Through the kindness of the Collectors of Customs at the various ports of the Province, I am enabled to give further information under this head at the end of the report.

I also beg leave to enclose the reports of W. Madden, Jr., Esq., Deputy Inspector of Mines for the District of Cumberland, Colchester and Pictou Counties; and of Patrick Neville, Esq., Deputy Inspector of Mines for the Island of Cape Breton. These gentlemen have paid regular visits to the mines in their respective districts, and report that generally every attention is paid to the observance of the Mines Regulation Act. They have prepared for the report a table showing the number of tons of water raised from the mines last year compared with the official returns of the number of tons of coal raised. From these tables it would appear that 3,646,889 tons of water have been pumped, in order to permit the raising of 1,352,205 tons of coal. They have alsc prepared tables giving the dimensions and duty of the pumps used at the various collieries, and these will, it is expected, be presented in the next annual report.

In September, the American Institute of Mining Engineers held their annual meeting in Halifax. Through the courtesy of the Minister of Railways, free passes were granted to the members over the Intercolonial Railway, and money grants to promote the objects of the session were given by the Dominion and by the Provincial Governments.

At the sessions many papers of interest were read, and excursions made on the harbor and to the New Albion Gold Mines at Montagu, etc. The citizens of Halifax materially promoted the success of the meeting by a reception and an excursion on the harbor.

After the conclusion of the meeting the members separated. One large party visited the Pictou coal mines, and by special trains, boats, etc., were afforded facilities for visiting the coal, iron, copper, and other mineral resources of Cape Breton. Another party visited the Londonderry iron mines, and the Spring Hill coal mines; while those whose time did not allow of any lengthened stay, returned by a special train through the Annapolis valley, visiting the Windsor plaster quarries, etc., on the way.

The visitors were much pleased and greatly impressed with the varied mineral resources of the Province; and the opportunities extended to them of becoming acquainted with our coal, gold and other ores will undoubtedly prove of benefit to us in the future. Their opinion of the Province may be gathered from the following quotation from observations on the meeting published by Dr. Raymond, Secretary of the American Institute of Mining Engineers:—" Nova Scotia has been treated with great partiality by nature, which has heaped upon it with great prodigal hand, the choicest treasures of her mysterious laboratory. Gold, the sorcerer that bewitches the world; coal, the mainspring of civilization; iron ore, manganese, gypsum, and many other useful minerals, are placed in large abundance within easy reach of man, in a fertile country with

wholesome climate. In their proximity to each other and to magnificent harbors, nature has provided all the natural elements of national wealth and prosperity. The artificial elements, capital and energy, only have to be added to secure for this favored land an enviable position among the nations of the earth."

The visit of these Engineers, many of whom are connected with the largest mining and mineral investment undertakings of the United States, will undoubtedly benefit us quite as much as their visit to Montreal a few years ago proved advantageous to that section of the Dominion, the result of which was speedily visible in a large investment of United States capital in the iron ore, phosphate, asbestos, and other mines of Quebec and Ontario.

The wisdom of the Provincial and Dominion Governments in facilitating their opportunities for seeing the country, were commented on by the Engineers, who arrived with an idea that the country was an inferior edition of the State of Maine, and left it impressed with the fact that it contained, in a small compass, unusually large stores of those minerals which nature seldom places in propinquity. The discussion of measures affecting our coal trade relations with the Atlantic ports of the United States cannot fail to be advanced by the experience of those who have personally seen the evidences of our ability to furnish cheap and good fuel to the iron and other manufacturing industries of the Eastern States, which are already dreading the gradual removal of these occupations to the cheap coal of the Western States.

MINERAL RESOURCES OF NOVA SCOTIA.

In the following remarks I have tried to give briefly, and as clearly as I could, an account of the value and extent of the mineral resources of Nova Scotia. I would refer those desiring more detailed information to the Reports of the Department of Mines, to Sir J. W. Dawson's "Acadian Geology," and to papers by the writer in the Transactions of the North of England Institute of Mining Engineers, the Transactions of the Nova Scotia Institute, etc.

It will be observed that we have in our Province coal, iron and gold, and the development of the two last named minerals will form an important page in our future history. Copper, manganese, antimony, barytes, gypsum, marble, etc., also occur in abundance, and have been worked to some extent.

Future researches will probably disclose other valuable minerals, thus the Precambrian rocks of Cape Breton, like their counter parts in Quebec and Ontario, may yield phosphates, plumbago, asbestos, etc., in addition to the iron and copper ores already known to exist in them.

These resources are being gradually developed, and few of the English colonies offer a more promising field to the miner and capitalist. The natural position of Nova Scotia projecting into the North Atlantic with fine harbors, cheap fuel, numerous minerals, its healthy climate and orderly population, and its nearness to England, all combine to forecast an important and prosperous future for it.

MINERALS OF NOVA SCOTIA.

COAL.

THE COAL FIELDS OF NOVA SCOTIA.

Nova Scotia coals belong entirely to the bituminous system of Dana, and may be subdivided into cooking, free burning, and carmel coals. It may be remarked that the coals of this country belong to the same geological horizon of the carboniferous system as those of England and the Eastern United States, and present many points of intimate connection in fossil remains and in the associated strata.

SYDNEY COAL FIELD.

This district occupies the eastern shore of Cape Breton County. Its land area is estimated at 200 square miles, and it now forms the rim of an extensive coal field extending under the Atlantic. Fortunately experience has proved that nearly all the seams can be followed in their subaqueous extension. Estimates based on the system of enquiry adopted by the Royal Commission on the duration of the coal supply of Great Britain, put the amount of available coal in these submarine areas, after making proper deductions for waste, etc., at not less than 2,000,000,000 tons.

The following section, taken in the Lingan district, will serve to show the thickness and relative positions of the best known seams :—

Seam.	Strata and Coal. ft.	in.
Seam A	3	..
"	306	..
Carr	6	5
"	190	..
Barrasois, or Hub	12	1
"	379	3
Harbor, Victoria or Sydney	8	..
" "	235	..
Seam D	3	..
"	78	..
North Head	4	..
"	75	..
McAuley, Phelan, or Lingan	8	..
" "	95	..
Ross, or Emery	4	6
"	340	..
Gardener	4	9

The coal field is remarkably free from disturbances, etc., and Professor Lesley, in a report, dwells strongly on this point.

Nearly all the seams lie at easy angles, yield little water, and owing to the generally firm character of the roof, they can be mined with unusual cheapness and safety. So strongly marked is the

impermeable nature of the strata, that at a moderate depth the submarine workings are perfectly dry.

There are seams found underlying those given in the above section, and varying in thickness from two to eight feet, but in the presence of the seams cropping on the shore they have not hitherto attracted much attention.

The coals of this district are bituminous, and specially adapted for gas and coke making, and for steam purposes. The Sydney Mines coal is largely used in the Lower Provinces for domestic purposes. The gas values may be understood from the following test made of the Harbor seam coal:—

Gas, cubic feet per ton........................	10,000
Candle power	16
Coke, good, lbs...........................	1,470

Official reports on this seam made to the Admiralty show that it contains 83.5 per centum of carbon, and that it is practically equal to Welsh steam coal. Trials made on H. M. S. *Gannet* show that when mixed with twice its weight of the best Welsh coal, a saving of 12 per cent over the Welsh coal alone was obtained. Practical tests made some years ago for the United States Naval Department, showed a practical evaporative power of 7.9 lbs. for the Sydney seam. Similar tests and trials of the other seams show equally good results, and Sydney Harbor has become a well-known port of call for steamers requiring bunker coal. Newfoundland sealing steamers prefer Cape Breton coal to all other owing to the rapidity with which it raises steam.

These coals have been largely used on Canadian railways, and are found to compare most favourably with the best imported coals, and in many cases are given the preference. As yet the slack coal has not been burned into coke except in small amounts for the local foundries, but considerable quantities are shipped to the United States, where an economical fuel is made by mixing it with the dust of anthracite coal for use under ordinary steam boilers. The contemplated establishment of large iron and copper works on Sydney Harbor will afford a near market for both slack and coke.

The following analyses will serve to show the general character of the seams of the district: *

Composition.	Name of Seam. Sydney.	Phalen.	Harbor.
Moisture	1·260	·921	·80
Vol: Comb: Matt: Fast Coking........	35·514	30·312	29·40
Fixed Carbon "	59·111	62·334	65·50
Vol: Comb: Matt: Slow Coking	33·840	28·625	27·85
Fixed Carbon "	60·785	64·021	67·05
Ash	4·115	6·433	4·30
Sulphur	1·705	1·105	1·29
Theo: Evaporative power	8·33	8·78	9·19

* The analyses of coals in this report are by the writer, and for full information on the compositions and values of Nova Scotian coals the reader may refer to a paper on Canadian coals by the writer in the Transactions of the North of England Institute of Mining Engineers, 1878.

The statistical tables of this report will show the production of coal and the various classes of labor employed in the collieries of Cape Breton County. It may be remarked that the collieries are well equipped, and worked in a systematic manner; and that, standing bĕtween the English and American coal fields, the operators have adopted from both the appliances and methods a varied experience has shown to be best adapted to the needs of Nova Scotian coal mining.

The enormous amount of available coal contained in this district may be estimated from the Geological Survey Report, which states that the seams now opened contain, in the areas leased for the purpose of working them, over 212,000,000 tons. This estimate does not include the coal in the seams which are unopened in the land areas in operation, nor the values of the seams in the leases which are at present awaiting a favorable opportunity for development, which items would swell the coal supply of this district to figures representing many years output greatly exceeding any yet obtained.

In addition to the seams already recognized in the Sydney coal field as at present worked, there are, in the vicinity of Sydney, and in the Mira and Salmon River districts, extensive tracts of the upper part of the millstone grit in which are met coal seams, some of superior quality, which although too small to be worked now in the presence of the large beds, must yield in the future an important supply of fuel.

OTHER CAPE BRETON COAL FIELDS.

On the River Inhabitants and at Port Hood, Chimney Corner, and Broad Cove, on the western shore of the Island, are small coal districts containing in all about 125 square miles, exclusive of the submarine extension of the seams found in them. At several points in these districts beds of coal of large size and of excellent quality have been opened, but as yet systematic coal mining operations in Cape Breton island have been confined to the Sydney district. It is claimed that many of these seams of coal are of very superior steam raising qualities, and it is anticipated that as the coal trade extends, the St. Lawrence markets will be largely supplied from this source.

Passing to Nova Scotia proper, coal seams are found at Pomquet and Antigonish, but the extent of productive ground is inconsiderable. Near New Glasgow, in Pictou County, there is a coal district, not of large extent, but noted for the great size of its coal beds, and for their excellent quality.

In 5,567 feet of strata, according to the surveys of the late Sir William Logan, there are 141 feet of coal contained in 16 beds, varying in thickness from 3 to 34 feet.

The coal is slightly less bituminous than that found in the Sydney distict, and is especially adapted for steam raising. Several of the coals make an excellent coke which has been successfully used with raw coal in the blast furnaces of Londonderry in Colchester County. The coal of the Acadia seam is also in demand for domestic purposes.

The following analyses of the Albion main seam, thirty-four feet thick, and of other seams now worked, will show the quality of the coals:—

Composition.	Albion Main Seam.	Acadia Colliery.	Six Feet Vale Colliery.	Intercolonial. Colliery.
Moisture	1·05	2·10	1·22	1·52
Vol: Comb: Matt: Fast Coking	27·42	32·78	25·87	31·87
Fixed Carbon "	62·18	57·57	62·70	57·78
Vol: Comb: Matt: Slow Coking	26·19	29·20	22·96	29·46
Fixed Carbon "	63·41	61·15	65·61	60·19
Ash	9·35	7·55	10·21	9·10
Sulphur	1·48	·50	trace.	1·62
Theo: Evaporative power	8·68	....	8·99	8·24

There are at several points in this district beds of oil shale, which may before long be found worth utilizing. Several beds of cannel coal have been found, one of which was for sometime worked on the property of the Acadia Coal Company, and yielded 126 gallons of crude oil to the ton.

There are four large and well-equipped collieries in this district. Their output is taken by the Londonderry Iron Works, local manufactories, and railways, and considerable shipments are made by rail and from Pictou Harbor to Quebec and Montreal.

The coal measures are interrupted at New Glasgow by lower strata, but in the opinion of Sir J. William Dawson, and other geologists, the coal measures extend many miles to the north and and north-west under the covering of the upper division of the carboniferous system. Possibly at some points this covering may be thin enough to permit of the coal being reached.

Small seams of coal are known all along the shores of the Bay of Fundy, but have not yet been worked.

The Springhill coal field lies north of the Cobequid Mountains, in Cumberland County, at the western extremity of the problematical coal field referred to in connection with the Pictou district. The northern edge of this coal field has been traced from the Joggins shore of Cumberland Basin, about 18 miles, to the Styles mine, but its deflexion to the south to join the Springhill coal mines district has not been followed. On the Southern or Springhill side of the basin there is a large and important development of coal seams. The productive measures stretch for many miles in a westerly direction to the Cumberland Basin at Apple River, but have not yet been prospected. Several mines have been worked on the northern out-crop at the Joggins, Maccan, &c., but the chief development has

been at Springhill by the Cumberland Railway and Coal Company, who have proved and extensively worked the following set of beds:—

		Ft.	In.	Ft.	In.
North Seam—	Coal	13	..	..	..
	Strata	..	..	105	..
	Coal	5	..	..	..
	Strata	..	..	130	..
	Coal	2	4	..	..
	Strata	..	..	185	..
Main Seam		11	..	..	..
	Strata	..	..	80	..
South Seam		11	..	..	..
	Strata	..	..	100	..
	Seam	8	6	..	..
	Strata	..	..	190	..
	Seam	4	..	..	..
	Strata	..	..	176	..
	Seam	2	9	..	..
		57	7		

Their out-put is now at the rate of 350,000 tons per annum, and is largely used for steam purposes on Canadian railways, steam-boats, &c. The coal is also adapted for domestic purposes, and its coke is extensively used at the Londonderry Iron works.

The following analyses made by me some time ago will show the quality of the coal of this district:

Contents.	North Seam.	Main Seam.	South Seam.
Moisture	1·625	.78	1·39
Vol. Combustible matter	28·672	31·32	31·22
Fixed Carbon	65·431	62·54	61·58
Ash	4·272	5·34	5·79
Sulphur	·783	1·38	·80
Evaporative power	8·99	....	8·46

The extent of country underlaid by the productive measures, is not yet clearly known, but has been estimated at 300 square miles. The district is intersected by the Intercolonial Railway; and a branch railway runs from the Springhill collieries to Parrsboro, on the Bay of Fundy, where extensive shipping docks are being constructed.

The history of Nova Scotian Coal Mining is a short one. Early writers of Colonial history refer frequently to the Cape Breton coals, which, outcropping on the beaches and in the sea cliffs, formed a prominent feature in the landscape, and were mined by the French and English garrisons of Acadia, and by a few American smugglers. This state of affairs continued until the early part of the present century, when, after a few attempts at systematic mining, the minerals of the

Province were granted to the Duke of York, who transferred them to the London jewellers, Messrs. Rundle & Bridge, who sold them to the General Mining Association of London in 1827. This company commenced extensive operations at Sydney, Pictou, and the Joggins in Cumberland Co., and continued them until 1857. At that time arrangements were made with the Government whereby the General Mining Association surrendered their claims, except to certain large tracts in the various coal districts, and the public were allowed to open mines under leases from the Government. This arrangement led to the opening out of quite a number of collieries, and the sales increased from 226,725 tons in 1858 to 395,637 tons in 1862. Nova Scotian coal was at this time admitted into the United States free of duty, and the sales to this quarter were about 450,000 tons in 1865 and 1866 out of a total of about 595,000 tons sold. In 1867 the U. S. imposed a duty of $1.25 a ton which in 1872 was lowered to 75 cents a ton. But the sales to the United States continued to diminish, until in 1885 they were only 34,483 tons. In the meantime, the consumption in Nova Scotia and the adjoining Provinces had been steadily increasing, until in 1885 the sales of Nova Scotia coal were as follows :—

Provinces of Nova Scotia	444,652
New Brunswick	148,634
Newfoundland	74,322
Prince Edward Island	52,770
Quebec	493,917
West Indies	5,732
United States	34,483
Total (long tons)	1,254,510

PETROLEUM.

Indications of this valuable mineral have been observed at Cheverie, Hants Co., in Pictou Co., and at Lake Ainslie in Cape Breton, but the result of explorations made in the latter locality have not proved satisfactory.

THE GOLD FIELDS OF NOVA SCOTIA.

The auriferous district of Nova Scotia stretches in an irregular band along its southern shore. Its area is estimated at about 3,000 square miles. The gold mines are scattered irregularly through this band, the greater number being to the eastward of Halifax. The auriferous districts are found to contain numerous veins of quarts from one inch to six feet in thickness, running continuously in many cases for several miles. Nearly all these veins contain gold, but, as elsewhere, only a certain percentage are rich enough to work. They carry the gold in visible grains imbedded in the quartz, and in the various sulphides of copper, lead, iron, etc., invariably found in them. The width of the veins usually worked varies from four to twenty inches, but in some cases they are found to be highly auriferous when much wider.

These veins carry gold in amounts varying from a trace up to several ounces, and in common with auriferous veins of other countries, frequently present it in the form of "pay streaks" or rich zones in the vein. These pay streaks are of varied width and depth, and are frequently very rich. In the Sherbrooke district one of these rich deposits was followed to a depth of 600 feet. The quartz surrounding these richer portions of the veins varies in value from three to ten dollars a ton. Other veins again show a uniform yield, not exceeding one-half to three quarters of an ounce to the ton for long distances.

Among the more prominent districts at the present time may be mentioned the Salmon River Mines. Here work has been carried on for several years on a vein of quartz from three to six feet wide. Several shafts have been sunk to a depth of about 150 feet, and ore has been extracted from a portion of the vein about 900 feet long. The quartz is crushed in a stamp mill driven by water power, and placed about a quarter of a mile from the mine. There are eight batteries, each holding five stamps, weighing about 700 lbs. each complete. The average yield from the quartz has varied between 7 cwts. and one ounce to the ton. Owing to the size of the vein and the cheapness of the water power crushing, this ore could be profitably treated even if the value of the gold yield fell to five dollars, or say twenty shillings to the ton. Since the opening of the mine 33,253 tons of quartz have been crushed and yielded 18,047 oz. of gold. This mine can be taken as a sample of others now working in the Province, but it will be understood that the narrower the vein the richer its contents must prove, as the expense of mining increases rapidly with the greater amount of dead work. At Montagu, Rawdon, Oldham, Stormont, and Lake Catcha profitable mining has been carried on during the past year.

However tempting the prospects of the rich quartz veins may prove to the miner, the great future of gold mining in Nova Scotia, in my opinion, lies in the so-called "low grade" ores. In many of the districts are met wide belts of slate and quartzite, intersected by quartz veins, both the veins and the rocks being more or less auriferous. Experience in the Western States has shown that ore such as this, mined in large quantities and crushed and amalgamated in large mills of 75 to 100 stamps, pays well even when worth not more than $5 a ton. Trials on a working scale have been made of such ores as they occur in this Province, and the field appears even more promising here than in any other gold mining country.

At Sherbrooke and Mount Uniacke large lots of this ore have been quarried and crushed in small mills, and the results have shown that such operations, if conducted on a large scale, with approved appliances, would pay well. The values of these crushings have averaged from 3 to 7 dwts. to the ton, and it can be safely asserted that nowhere can labor and the usual supplies of mining camps be procured more cheaply than in Nova Scotia.

ALLUVIAL GOLD.

In Nova Scotia, contrary to the history of most gold mining countries, alluvial work has played an insignificant part. It is generally believed that the causes, which have contributed to the present contour of the country, have swept all detritus away into the Atlantic. This is a mistake. Australian miners assert that bare rock surfaces are not more abundant in the district under consideration than in the gold districts of Australia. Small amounts of gold have been procured by alluvial work at Tangier, Waverley and Moose River, but no systematic attempts have been made to test the old river courses, or the still waters, etc., of the present drainage systems which run for the most part transversely to the strike of the veins. Many of the districts have a surface apparently rich enough to treat by sluicing and crushing, and several of the rivers are reported to give good tests.

At Gay's River, an ancient indurated sea beach or river bed lying on the auriferous measures, carries gold at the junction of the slates and conglomerate, and has been worked to some extent.

MINING.

The veins dip at all angles and are invariably opened by shafts sunk on the dip of the vein. This is not perhaps quite according to mining text-books, but experience shows that it is best adapted to the veins and to the encasing strata of this country. The stopes are carried from shaft to shaft, a distance of from 80 to 200 feet, by underhand work, powder or dynamite being used. The firmness of the rocks makes the mines usually very dry, and the expense of pumping is small whenever the surface is properly drained. The cost of mining, there being little dead work, varies according to the size of the vein and the hardness of the encasing rock, from 50 cents a ton in the open cast work to $15 a ton in the narrow and tight bound veins. The quartz is crushed in stamp mills similar in general construction to those used in other parts of the world. The stamps weigh from 450 to 750 lbs. and fall at the rate of from 30 to 50 drops a minute. Mercury is fed into the mortar in which the stamps work, at frequent intervals, and the coarse gold is amalgamated and retained around the dies in the bottom of the mortar. The mills in common use in the Province crush to a fine powder about a ton of quartz to each stamp, in a days' work; when quartzite and slate are being treated more rapid progress is made. The pulverised ore is carried by water through fine screens and over copper plates amalgamated with mercury for the purpose of arresting the fine gold.

As already mentioned, the veins always carry sulphides, etc., of various metals, which include considerable amounts of gold. This gold is but partially arrested in the mill or on the plates, and usually passes into the refuse tailings. Assays show that these tailings when concentrated, are often rich enough to warrant attempts being made to save the gold, but hitherto no systematic attempts have been made in this direction.

All the auriferous ground in the Province is the property of the Government, and it issues leases for three terms of twenty years. The areas are laid off in rectangular form, each area being 150 by 250 feet, with the shorter sides parallel to the general run of the veins and the beds of the district. The fee paid for each area is two dollars. Similar areas can be taken under prospecting licenses for the space of six months, on payment of a small registration fee. Provision is made whereby the holder of any lease can require by arbitration or by grant from the Government, the ground needed for mining purposes. In return the lessee is required, under risk of forfeiture, to employ forty days labor on each of his leased areas, and to make periodic returns of this labor, and of all quartz sent to a mill.

Any person desiring to build a quartz crusher must procure a license therefor, and give bonds for the due discharge of his obligations, which are to keep an account of all quartz crushed, and to pay to the Government the royalty on all gold extracted. This royalty is at the rate of two per cent. on unsmelted gold valued at $18 an ounce, and at the same rate on smelted gold valued at $19 an ounce. By this arrangement the miner having delivered his quartz to the mill owner is free from any responsibility about the royalty, as the Government looks to the licensed mill owner for it.

The statistical tables at the end of the report show the yield of each district during the past year, and a summary of the returns since the compilation of statistics was commenced.

IRON ORES.

This, perhaps the most important of our mineral resources, has not as yet received attention at all commensurate with its value. The ores are of the most varied species and frequently very pure. They are generally accessible, near water or railway transport, and none of them at any great distance from coal. Beginning at the western end of the Province, titaniferous iron sand is met at St. Mary's Bay, and the trap rocks forming the south side of the Bay of Fundy yield abundant indications of specular and magnetite. At Clementsport and Nictaux are beds of red hematite and magnetite, formerly worked to a small extent in charcoal furnaces. From this point as far west as Windsor, specular, red hematite and bog ores are found, but little is known of their extent or value. Similar ores, sometimes highly manganiferous, are met between Windsor and Truro, at Goshen, Maitland, Brookfield, etc. The following analysis of limonite from the last named place is of a very pure ore:—

Water	11·36
Silicious matter	1·54
Phosphoric acid	trace.
Sulphuric acid	none.
Magnesia	trace.
Metallic iron	60·00

On the north side of the Bay of Fundy the limonite ores of Londonderry are well known. Their passage has been traced for fifty miles along the range of the Cobequid Hills, and they have been worked for many years at the Acadian Mines. Large amounts of a variety of spathic ore are mined and smelted with the limonite, and a good grade of pig made, part of which is converted into bar iron, etc. There are two large blast furnaces, with rolling mills, foundries, etc., and from 40,000 to 60,000 tons of ore are annually smelted. The following analysis will show the character of the iron ores, and of the iron made at this establishment:—

	Micaceous Hematite.	Limonite.
Per oxide of iron	96·93	82·65
Oxide of manganese		·25
Alumnia	·33	·56
Lime	·04	·15
Magnesia	·11	·10
Phosphoric acid	·07	·38
Sulphuric acid	·03	·02
Water hygroscopic	·03	·31
Water combined	·79	10·51
Insoluble	1·26	4·79
Metallic iron	67·85	57.85

Spathose Ore (Sideroplesite.)

Insoluble silicious matter	·47
Calcic carbonate	·59
Ferrous "	69·20
Manganous "	1·37
Magnesic "	28·73
Ferric oxide	·08

Analysis and tests by Riehle Bros.

Bar iron ductile and fine grained. Tensile strength. 60,000 lbs. per square inch, and elongation 33 per cent.

	No. 1 Pig.	Sieman's best Bar Iron.
Silicon	3·621	·280
Graphitic carbon	3·730	....
Combined carbon	·390	·096
Sulphur	·002	trace.
Phosphorus	·198	·035
Manganese	1·126	·041
Iron	90·933	99·548

Iron ores are known at Pugwash, Wallace, Joggins, Clark's Point, etc., north of the Cobequid Hills.

The Londonderry iron ore bearing ground passes north of Truro and extends into Pictou county, and may be said to terminate at Cape George in Antigonish county. On entering Pictou county near the line of the Intercolonial Railway, are met widespread indications

of specular ore, which at several points show veins of workable size. This specular ore ground extends to the head of the East River, a distance of about twenty miles, and carries ore veins, which, as proved on the Watson and Weaver properties, attain a thickness of fifteen feet. South of this band are deposits of limonite ores, which, however, are yet little known. In the vicinity of Springville, between the specular ore and the Pictou coal field, are large and valuable beds of limonite, sometimes highly manganiferous, and bedded red hematites attaining a thickness at some points of from 20 to 40 feet. Among the more prominent localities holding these ores may be mentioned Springville, Bridgeville Blanchard, Little Blanchard, Webster's Mountain and Fall Brook. On Sutherland's River these ores approach the eastern end of the coal field, and the Watson ore bed at Fall Brook is about two miles from the Vale colliery, and is about fifteen feet in width. Still further east near the line of the New Glasgow and Cape Breton Railway are deposits of spathic iron ore and of clay ironstone. These ores extend for many miles, until the measures carrying them are cut off by the Gulf of St. Lawrence. An exposure of a bed of red hematite three feet thick at Arisaig marks the termination of this district, which is fifty miles long, and attains a maximum width of about six miles. Clay ironstone is met at several points in the Pictou coal field and between New Glasgow and Pictou.

The following analyses will show the character of the Pictou iron ores:—

	Limonite.	Clay Ironstone	Specular.	Red Hematite.
Water	7·702	2·132	......	......
Iron Peroxide	87 925	45·361	97·52	65·26
Alumina	trace.	16·962	......	5·59
Silica	3·000	·780	3·20	25·68
Manganese Binoxide	trace.	......	......	......
Lime	do.	trace.	·91	1·88
Magnesia	·500	1·655	......	1·05
Sulphur	trace.	·612	·06	......
Phosphorus	do.	trace.	trace.	......
Metallic iron	65·54	35·00	68·33	43·4
Carbonic acid	......	......	......	......

The following analyses is of the spathic ore from Sutherland's River:—

Sesquioxide of iron	20·52
Carbonate of iron	57·40
Carbonate of manganese	8·29
Carbonate of lime	4·02
Carbonate of magnesia	5·66
Silica	2·38
Moisture	1·43
Sulphur	none.
Phosphorus	none.
Iron	42·07

It may be remarked that in Pictou county the conditions for making iron and steel cheaply are unsurpassed, as within a few miles are collected numerous iron ores, fluxes, and good furnace fuels, and there is railway and water communication with all parts of the Dominion.

In Cape Breton indications of valuable iron ores are frequently met, but hitherto there has been little inducement to test or develop them. Near East Bay a bed of red hematite ore from 4 to 13 feet wide has been traced several miles. The following analysis of it is from the records of the Geological Survey of Canada:—

Iron Peroxide	85·057
Silica	5·130
Sulphur	·075
Phosphoric acid	·032
Metallic iron	57·526

At Whycogomagh, on the Bras d'Or Lake, several beds of red hematite and magnetic iron ore have been followed for some distance, by trenches and natural exposures. Both these deposits are close to good shipping places.

Louisburg, Gabarus, Big Pond, Lake Ainslie, and St. Peter's, among other localities, may be mentioned as likely to contain valuable ores.

The conditions upon which iron ore lands are leased by the Government are similar to those regulating the coal properties, and will be referred to further on.

There are numerous localities yielding iron ores beside those I have briefly touched upon. Among these may be mentioned Salmon River Lakes, Boyleston, and Manchester, in Guysboro' county, where valuable deposits of specular ore have been superficially tested. At Stewiacke, Riversdale and Musquodoboit are ores of red hematite and limonite, while at numerous points over the Province are deposits of bog iron ore, often of good quality, and a valuable accessory to local smelting operations.

COPPER ORES.

Indications of copper ore are widespread throughout the Province, and although promising at several points, explorations have, in a few instances only, been pushed far enough to show workable deposits. The trap of Annapolis and Kings counties shows native copper, with carbonates, etc. Among the more promising localities may be mentioned Margaretsville, Digby, and St. Mary's Bay, Cape d'Or, etc. The carboniferous measures of Pictou, Cumberland, and Antigonish counties frequently show deposits of the vitreous sulphide and of carbonate of copper, and some of them may prove valuable. At several points in this district small lots of rich ores have been exported, but no attempts have been made at systematic work.

In the vicinity of College Lake, in Antigonish county, several valuable deposits of copper pyrites have been thoroughly tested. It is believed that large amounts of ore running from three to eight per cent. can be obtained here, but the depression in the copper trade has prevented development. In Cape Breton the precambrian felsites frequently show copper pyrites. These have been prospected with promising results at Gabarus and French Road, and at Coxheath near Sydney. At the last named locality a large amount of work has been done, showing the presence of immense masses of ore carrying from 3 to 8 per cent. of copper. Preparations are now being made to smelt these ores into a matte, a business for which the locality affords every facility in the way of fuel, fluxes, shipping ports, etc. Other localities are Cape North, Cheticamp, East Bay, Benacadie, etc.

LEAD ORE.

In this Province the only source of galena appears to be the carboniferous marine limestone series. At Gay's River, Shubenacadie, and Stewiacke it is frequently met in these rocks. At Smithfield, Upper Stewiacke, the limestones carry at several points large masses of galena, with copper and iron pyrites and calcite, and small amounts of silver are reported to be present in the galena. Preparations are being made to erect experimental smelting works at this point, as it is believed that an abundant supply of ore can be secured.

ANTIMONY.

This ore is known at several localities in the Province, but has hitherto been worked only at Rawdon, Hants county. Here a vein from 6 to 20 inches in width has been successfully worked during the past two years, and has yielded a very pure ore, all of which has been exported to England. The exports during the year 1884 were 463 tons, valued at $17,865, and during the year 1885, 758 tons, valued at $33,095. At present only the higher grade ore is shipped from this mine, and the accumulations of low grade ore await treatment. At the New Brunswick antimony mines this was largely smelted at a central furnace, and no doubt a similar plan could be advantageously adopted here.

MOLYBDENUM.

This mineral occurs at Gabarus in Cape Breton, and at Hammond's Plains and Musquodoboit in Halifax county. Small lots have been shipped from the first named locality, but no demand has yet risen to warrant attempts at its regular extraction.

NICKEL AND COBALT.

These elements occur in small quantities in the associated minerals of our auriferous veins, etc., and some of the iron sulphides occurring in the upper horizons of the lower cambrian hold them in notable amounts. Hitherto no attempt has been made to ascertain if they can be turned to any account.

MANGANESE.

There are numerous localities in the Province which have yielded rich deposits of these ores. At Tenny Cape, Hants Co., Onslow, Colchester Co., and Salmon River, Cape Breton Co., small shipments are annually made of very rich ore, containing from 89 to 98 per cent. of binoxide, with mere traces of iron. The exports are principally to glass makers in the United States, and the ore brings from $75 to $100 a ton at the mines. Few shipments are made of the low grade ores, which are abundant, and a large trade could be done if a start were once made. Among other localities may be mentioned Pictou, Bridgeville, and Glengarry, Pictou Co., and Amherst, Cumberland Co.

Beds of wad, or bog manganese, are found at numerous points, but hitherto it has not proved profitable to export them.

GYPSUM.

This mineral occurs in the Province as soft or hydrated, and as hard or anhydrous gypsum. It is exposed in beds, varying in thickness from a few inches up to 200 feet, and is also found in fine grains and veins in the shales, marls, and limestones which are usually associated with it. In the Maritime Provinces it occurs in the carboniferous marine limestone formation, already referred to in connection with the manganese ores, and wherever the limestones appear it is usually at no great distance. It is so widely scattered through the northern and eastern parts of Nova Scotia that a detailed list of its exposures could not be given. It has been mined chiefly at Windsor, Cheverie, Walton, Maitland and Hantsport on the Bay of Fundy, and at Port Hood, Port Hawkesbury, Lennox Passage, Baddeck, and St. Ann's, in Cape Breton. Among the minerals found in the gypsum may be mentioned glauber salt, common salt, magnesium carbonate, sulphur, and several varieties of borates, similar to the Peruvian Ulexite and "Tiza." Should these borates be found in any amount in our gypsum beds they would undoubtedly prove of great value.

The Nova Scotian deposits of gypsum are on an unequalled scale, the beds being frequently traceable for miles by exposures presenting faces 50 feet in height. In Antigonish Co. it occurs on St. George's Bay as a crystalline cliff, 200 feet high, and similar exposures are met at

Plaster Cove, Mabou, and many other localities in Cape Breton. This scale of exposure, and frequent proximity to good shipping places, has materially aided the out-put of the mineral, and it can at many points be placed on board for 50 or 60 cents a ton.

The anhydrite is found imbedded in the soft gypsum, but is seldom exported. The exports of gypsum are almost entirely to the United States, where it is ground as a fertilizer, or boiled and ground for finishing houses, cornices, etc., according to its purity and color.

It is said to be a suitable dressing for tobacco and cotton lands, and large quantities are mined for this purpose in Virginia. The gypsum is used to a very limited extent in Nova Scotia for agricultural purposes; in fact in our best farming districts nature has disseminated this useful fertilizer very freely. A large mill in New Brunswick supplies the local market with the prepared article as required for architectural purposes. The annual exports, chiefly from Windsor and its vicinity, on the Bay of Fundy, vary from 80,000 to 140,000 tons, valued at about 95 cents a ton.

MINERAL PAINTS.

As might be anticipated in a country yielding iron and manganese ores, the different varieties of ochres and umbers are frequently met. Among the various localities yielding these mineral paints may be mentioned Londonderry, Onslow, Stewiacke, Maitland, Chester and Kentville. Small amounts are dried and ground for local use, but the trade is almost exclusively supplied from foreign sources.

BARYTES.

This mineral occurs at Five Islands, Bay of Fundy; River John, Pictou County, and at Stewiacke, Colchester County. At the latter place about 300 tons were mined last year, and was worked up at Halifax in the manufacture of paints, etc.

MINERAL WATERS.

At numerous localities through the Province mineral springs have been known for many years, and are used for various complaints. Few of these waters have been analysed, but they are worthy of careful examination, as the presence of mineral waters of undoubted excellence has frequently done much to attract visitors, and produce benefits important if not conspicuous.

In the gypsiferous districts brine springs are frequently met. Some of the springs in the early days of the settlements were utilised by those living in the vicinity, and considerable amounts of salt manufactured for home use. Now the imported salt has so lowered prices

that salt-making has ceased to be a provincial industry. The presence, however, of these brine springs is of importance in relation to the possibility of beds of salt being connected with the gypsum beds. Should examination prove this to be the case, a large and valuable industry would be revived. The same speculative interest attaches to the instances of sulphur occurring in the gypsum and gypsiferous marls.

BUILDING STONES.

The building stones of Nova Scotia are principally granite and sandstone. The various grades of the latter are procured principally from the upper divisions of the carboniferous system. Pictou, Colchester, and Cumberland Counties, therefore, are the principal producers. Many of the quarries in these counties have yielded stone for the construction of the public buildings of the Maritime Provinces, and of the New England cities. The granite of Halifax, Shelburne, and Ship Harbor is of excellent quality, and is largely used in foundations, steps, etc. Among other building material may be mentioned marble from Cape Breton, and limestone from Pictou and Antigonish Counties. The celebrated fortress and city of Louisburg was largely constructed of local crystalline diorite.

Slates of excellent quality occur in large quantities at Rawdon, Hants Co., and at several other localities, but at present they are in little demand, as roofs are covered with wooden singles.

Brick Clays of excellent quality abound in many places, and are worked to a small extent. The cheapness of wood has hitherto retarded the introduction of brick as a material for building purposes, except in the towns. However, brick buildings are gradually coming into more general favor, and a new market has been opened up in the manufacture of drain tiles, which are used in large quantities.

Among miscellaneous minerals may be mentioned plumbago, fire clay, refractory stone, soapstone, felspar, kaolin, infusorial earth, etc. These are known to exist in the Province at numerous points, and in quantities admitting of economic development, but at present the demand is not large enough to direct particular attention to them.

TENURE OF MINERAL LANDS.

The grant of lands to the early settlers in this Province contained no regular reservation of minerals, in some instances gold, silver, and precious stones only were reserved, in other cases the gold, silver, iron, copper, lead, etc., were retained for a source of revenue to the Crown. After the agreement with the General Mining Association, the Government passed an Act by which they retained in previous grants the gold, silver, coal, iron, copper, lead, tin and precious stones whenever reserved, and for the purposes of revenue made the above reservations in all future grants. This Act releases to the owner of the land all

gypsum, limestone, fireclay, barytes, manganese, antimony, etc., etc., and any of the above reservations, whenever they are not specified in the grant. There is no complete list published of all the grants, but information as to every grant can be obtained at the Crown Lands Office. The Department of Public Works and Mines is charged with the collection of revenue from the mines, the enforcement of the Mines Regulation Act, etc. Reference has been already made to the mode of granting gold licenses and leases, and the same remarks apply to silver and its ores. For all other minerals held by the Government for revenue purposes a somewhat similar system is adopted.

On application a tract not exceeding five square miles, called a License to Search, can be obtained for one year at a cost of $20. Out of this the applicant may select, before the expiration of the term of one year, a tract of 640 acres, (one square mile,) for which he pays $50. This is termed a right to work, and lasts for two years, and can be renewed for a further term of one year, on payment of $25. During the existence of this right to work, the holder, if he commences *bona fide* mining operations, is entitled to a lease for twenty-one years, and renewals for three further terms of equal length. Provisions are made for securing the surface ground needed for mining, for proper returns, and for forfeiture on neglect to comply with the requirements of the lease, etc.

All the regulations connected with the leasing and working of the Provincial mines are framed with the view of affording all proper and necessary facilities to those desirous of entering into mining operations, and among not the least of these advantages may be mentioned the security of the title granted and registered by the Government.

The following are the rates of royalty paid by those holding under the Government :—

Each licensed mill owner shall pay or cause to be paid, in money, in weekly or other payments, as the Commissioner of Mines shall order, to the Commissioner or to the Deputy Commissioner for the district, a royalty of two per cent. on the gross amount of gold obtained by amalgamation or otherwise in the mill of such licensed mill owner, at the rate of nineteen dollars an ounce troy for smelted gold, and eighteen dollars an ounce troy for unsmelted gold, and of two per cent. on the silver, at the rate of one dollar per ounce troy.

Coal.—Seven cents and one half of a cent on every ton of two thousand two hundred and forty pounds of coal sold or removed from the mine, or used in the manufacture of coke, or other form of manufactured fuel.

The words "removed from the mine," in the preceding section, shall not be held to apply to coal used for domestic purposes by the workmen employed in and about each mine; nor to coal used in mining operations in and about the mine from which such coal has been gotten ; but coal so used shall not be liable to pay royalty.

Copper.—Four cents upon every unit, that is, upon every one per cent. of copper contained in each and every ton of two thousand three hundred and fifty-two pounds, of copper ore sold or smelted.

Lead.—Two cents upon every unit, that is, upon every one per cent. of lead contained in each and every ton of two thousand two hundred and forty pounds, of lead ore sold or smelted.

Iron.—Five cents on every ton of two thousand two hundred and forty pounds of ore sold or smelted.

Tin and Precicus Stones.—Five per cent. on their values.

COAL TRADE.

The total sales for the year 1885 amounted to 1,254,510 tons, made up of 778,378 tons of round, and 247,676 tons of slack coal, and 228,456 tons of run of mine coal, as compared with 1,261,650 tons sold during the year 1884, comprising 945,518 tons of round and 316,132 tons of slack coal.

The following are the most noticeable points in the coal trade:—

The home sales were 444,652 tons compared with 493,050 tons in 1884, and 471,327 tons in 1883.

The Province of Quebec took 493,917 tons, against 396,782 tons in 1884, and 410,605 tons in 1883.

The sales to New Brunswick were 148,634 tons, compared with 158,420 tons in 1884.

Newfoundland took 74,322 tons, against 86,216 tons in 1884.

The sales to Prince Edward Island were 52,770 tons against 50,399 tons during the preceding year.

The West Indian sales have again decreased, being 5,732 tons against 9,595 tons during 1884, and 31,860 tons in 1883.

The sales to the United States were made up of 10,497 tons of round and 23,986 tons of slack coal, against 64,515 tons in 1884. These sales to the United States are the smallest recorded since the year 1850.

CUMBERLAND COUNTY.

The total sales of this county amounted to 340,535 tons against 258,405 tons in 1884, and 222,347 tons in 1883.

The home sales were 83,953 tons, against 59,502 tons during the preceding year.

The sales to New Brunswick were 92,872 tons against 93,724 tons during 1884.

The Province of Quebec took 163,303 tons, as compared with 104,243 tons in the year 1884.

COLLIERIES.

Chignecto.—During the past year a few men were employed at this mine, and the air ways, levels, etc., were kept in repair. The output was 6,084 tons.

Joggins.—Work has been continued in the new slope, and the levels are now over one thousand feet to the eastward. The seam presents the following section:—

	ft.	in.
Top coal	3	6
Fire clay.............................	1	6
Bottom coal	2	0
	7	0

A new furnace 7 feet by 5 feet above the bars has been put up, with a column of 100 feet. The output of the mine was 17,664 tons against 25,034 tons in 1884.

Minudie.—During the shipping season work was continued as usual at this mine, and the output was 7,702 tons as compared with 10,023 tons during 1884.

At the Milner Mine a little work was done, and Mr. S. E. Freeman, during the fall, opened out the slopes in the old Lawson Mine, and extracted some coal.

Springhill.—The operations of the Cumberland Railway and Coal Company have been pushed with their usual enterprise. The sales for the year are the largest for any single company, being 335,055 tons, against 232,481 tons during the preceding year. The development of the South slope has been continued, and further exploratory work carried on in a recently acquired property lying to the south east of it. The underground operations have been continued as usual.

The Company are now preparing to extend their railway from its present terminus at Parrsboro Village to the mouth of the river, and to construct at that point a dock for coal shipments on a large scale. This arrangement, when completed, will provide an outlet which will probably assure the control of the Bay of Fundy and the St. John coal trade to this district.

The Saltsprings Colliery engine house was burned down during the summer, and the company have not resumed work. Mr. W. Patrick continued opening out his mine at Maccan, which yields a coal of very superior quality, and is now prepared to ship steadily.

PICTOU COUNTY.

The total sales were 396,000 tons against 464,181 tons in 1884.

The home sales were 209,428 tons, against 262,780 tons during the preceding year.

The Province of Quebec took 145,363 tons, compared with 139,934 tons in 1884.

The sales to Newfoundland, Prince Edward Island, and New Brunswick remain about the same as in 1884.

COLLIERIES.

Acadia.—Work has been continued with customary regularity. The new pump has been found to work well. As it is the heaviest single lift in America, the following notes will be of interest:—

The mine is opened by a slope 2400 feet long, vertical depth 1000 feet. The pump is a Knowles of the duplex compound condensing type, with high and low pressure steam cylinders, 12 and 22 inches in diameter, 24 inch stroke with four $5\frac{1}{2}$ inch plungers working against a head of 435 lbs. per square inch. The column is six inches in diameter, of wrought iron, the air chamber is 30 by 15 inches, the steam pipe, 2600 feet long, and four inches in diameter takes the steam from Babcock boilers on the surface, at a pressure of 105 pounds. The pipe is protected with an infusorial earth jacket, the material being taken from a local deposit. After a year's service this pump has given no trouble, and no joints have leaked. There is no suction on the pump, the lower valves being below the level of the pump. The pump usually makes 10 double strokes a minute, but could run 25 strokes, equal to 100 feet piston speed a minute. A small hydraulic ram will raise the water from the lower level to the pump.

Albion.—There is little new to be noticed at these works during 1885. The McGregor pit was closed during the summer, as the coal trade was dull. The slack from the Third Seam was used at the Coke ovens and found to answer well. During the past season new ropes were put in the Foord Pit Shaft, and the level of the water was lowered by tanks. By utilising the plant at this point, the expense of new pumping gear in the Third Seam winnings is obviated. The output was 129,195 tons against 201,557 tons during the preceding year.

Intercolonial.—The main slope is now 2650 feet long, the underground engine hauling 950 feet, and the surface engine hauling the remainder of the distance. During the summer a tendency to "creep" which showed itself on the 1700 feet level was checked by cutting out a few pillars. No work was done in No. 4 Slope, and in the new pit. The output was 109,139 tons compared with 120,656 tons in 1884.

Montreal and New Glasgow.—During the year 1885 a little work was done on this area by Mr. Muir, and the coal extracted was favorably received in the New Glasgow market.

Vale Colliery.—Operations in the McBean Seam were interrupted for a short time by a serious accident, attended with much loss of life. From examinations made by me, I was led to believe that the ignition and explosion of a comparatively small amount of gas was extended by the combustion of coal dust. More particulars will be given further on in the report, The results of the investigations made by me and Mr. Madden, Deputy Inspector, are given by him in his report.

The Six Feet Seam is now opened and in full working order. A very fine pair of winding engines has been put up, with the necessary

heapstead, screens, branch railway, etc., and will prove an important factor in the future coal trade of the district. The output was 76,125 tons against 73,529 tons in 1884.

CAPE BRETON COUNTY.

The total sales during the past year from Cape Breton County were 517,975 tons, compared with 539,064 tons in 1884.

The home sales were 151,371 tons, compared with 179,768 tons in 1884.

New Brunswick took 28,498 tons against 39,463 tons in 1884.

The Newfoundland sales were 69,833 tons, compared with 83,143 tons during the preceding year.

The sales to Prince Edward Island were 13,613 tons against 19,056 tons in 1884.

The sales to Quebec show 215,254 tons, compared with 152,605 tons in 1884.

The West India trade showed only 5,618 tons against 21,872 tons during the preceding year.

The trade with the United States was only 33,788 tons, compared with 62,565 tons in 1884.

COLLIERIES.

Sydney.—Operations at this colliery were interrupted last spring by a serious fire, which was only extinguished by tapping the metal tubbing of the shaft, and drowning out the district in which the fire was situated. In the fall an opening was made into the Francklyn submarine lease, and operations will be continued as far to the rise as the cover will permit. The output was 124,274 tons, against 149,378 tons in 1884.

Victoria.—This mine may now be considered in full working order, the output for last year being 47,614 tons. Surveys have been made for the extension of the railway about 2½ miles to the Barasois, where an opening is being made on the Barasois seam. Should the road ultimately be extended to Lingan, and the artificial harbor at the latter place be abandoned, the company will be in a position to meet any demands for coal at their pier at the South Bar.

Lingan.—Work here presents no new features of interest. The output was 21,761 tons, compared with 23,404 tons in 1884.

Reserve.—Work has been continued briskly at this mine during the past season. The dip slope has reached the Emery Seam, and preparations are being made to win out pit room. The engines, shops, etc., having been concentrated at the Reserve Mine, the company will

be able readily to carry out their plan of working all the areas from this point. The output was 83,276 tons, against 87,216 tons in 1884.

International.—Operations at this mine present no new features. The main dip is now 2000 feet in length, and the levels are being steadily advanced to the east and west. A new shop for locomotive and other repairs, and a new office, have been erected. The output was 67,959 tons, compared with 87,485 tons in 1884.

Bridgeport.—Mr. Henry Mitchell has completed fitting up his colliery, and is now ready for steady work. During the past season he raised 13,178 tons of coal.

Little Glace Bay.—No change has been made in the operations of the mine. The output was 39,400 tons, compared with 36,138 tons in 1885.

Caledonia.—The extraction of coal has been continued in the pillars. A dip plane has been driven down a short distance west of the pit bottom, and the coal is raised by an underground engine. The output was 58,859 tons against 69,461 tons in 1884.

Ontario.—A little work was done in the upper level of this mine, and a few cargoes shipped.

Block House.—The work of extracting pillars was continued during the summer, and was facilitated by the dryness of the season. The output was 11,075 tons against 22,668 tons in 1884.

Gowrie.—A pair of dip slants are being pushed from a point east of the new shaft, and have opened up a fine tract of coal. The question of utilising slack coal is being tested by the Messrs. Archibald. They have erected a Yeadon patent Briquette machine. Roughly speaking, the operation consists in thoroughly mixing the slack with pitch and compressing it into bricks under a heavy pressure. Mr. Charles Archibald writes :—

"The Briquette Plant is capable of making fifty-four tons of briquettes in ten hours. The weight of each brick is about 11½ lbs., and we allow 195 bricks to the gross ton (2240 lbs.) The briquettes are made from the fine coal and eight to nine per cent. of coal tar pitch. This fuel is particularly adapted for steam purposes, and is most suitable for locomotives. It is easy on fire bars and leaves fine ashes. We expect to get a market in the West Indies and South America as well as a market in the Dominion."

The output of the mine was 74,414 tons against 89,384 tons in 1884.

GOLD.

The returns show that 157,421 days' labor were performed, and that 28,890 tons of quartz were extracted and crushed, yielding 22,203 oz., 12 dwts. of gold, during the year.

I am pleased to be able to state that the anticipations of a good year's work, ventured in my last report, have been verified, the yield having exceeded that of the preceding year by 6,124 ounces, and being the largest recorded since the year 1867, at which period the yield was :—

1865	25,454	ounces.
1866	25,204	"
1867	27,314	"

Encouraging as this may appear, it is still evident that when a comparatively small production, such as this is considered, the failure of one or two productive mines will seriously affect the year's total. Since the year 1862 the total annual production has varied between 7,275 and 27,314 ounces, an amount totally out of proportion to the known richness of many districts, and the extent of auriferous ground. I would strongly urge upon our gold miners the importance of testing and developing all possible supplies of low grade ore. Several districts are known to contain large bodies of such ore, and in this country, with its abundant water power, cheap supplies and labor, and its favoring climate, gold mining must, in my opinion, seek its future expansion in this branch of the business.

DISTRICTS.

Caribou.—The returns for 1885 show that 2,239 tons were crushed, yielding 1,335 ounces, as compared with 1,559 tons yielding 966 ounces in 1884. There was some work done by Mr. Touquoy, and by Mr. Wright on the Heatherington property. The Lake lead, opened during the preceding season, was worked successfully.

At Moose River a good deal of work was done by tributors on the little North lead on the Moose River gold mining property. Mr. Touquoy prospected to the west of this property, and found a new eight inch lead, good for about one ounce to the ton.

Darr's Hill.—The Dufferin Gold Mining Company have concluded a highly satisfactory year's work. The main shaft is now about 150 feet deep, and toward the east the vein has been found to increase in width and richness. There were 10,880 tons of quartz crushed, yielding 4,924 ounces of gold, the total yield being to the

end of 1885, 18,047 ounces from 33,253 tons of quartz. Another equally promising lead has been found here.

Fifteen Mile Stream.—The operations of the Hall, Anderson Company were continued on the lodes referred to in previous reports, until midsummer, when work was stopped. Mr. Hudson continued working, and steady returns have been made from his property, and it is to be hoped that the regularity and persistence of his operations will again bring this district into the prominent position it merits.

Gay's River.—A little work was done here at one or two points.

Montagu.—During the year 1885 the New Albion Gold Mining Company continued to work the DeWolf and Twin leads. The returns show that 2,809 tons yielded 4,001 ounces, placing this district second in the rank of the gold producing localities of the Province.

The deepest shaft, No. 1, on the DeWolf lead, reached a depth of 150 feet, and stopes were carried along the vein for a distance of about 700 feet. On the Twin lead stopes were driven about 500 feet, the main shaft being 150 feet deep. During September a very rich paystreak was struck, which yielded 1,369 ounces from 337 tons of quartz. As is not unusual, the quartz surrounding this streak proved during the remainder of the year, comparatively low grade. Operations in this lead have been continued, and the Twin lead is proving richer. A new lead called the Iron lead is being opened up.

Some prospecting was done by Mr. Oakes and others to the south of the New Albion area.

Oldham.—Mr. McDonnell and others continued their shaft, referred to in my last report, to a depth of 200 feet. In the fall operations were discontinued, pending the erection of steam power for more efficient pumping and hoisting purposes.

Mr. Hardman continued working to the westward of Mr. McDonnell, and has opened up an unusually rich lead, promising large amounts of mill ore. He has perfected his arrangements for pumping and hoisting at his main shaft, by power generated by a motor driven by the water power at his crusher, distant about one half a mile. Some quartz was taken out by the Messrs. Donaldson and others, but the principal operations were confined to the points referred to. The returns show that 1,170 tons of quartz yielded 2,360 ounces of gold.

Renfrew.—Mr. Hayward contined to work the Empress Mine and is now getting into excellent ground. Crushing was at a standstill during great part of the season, owing to an unusually dry spell. Mr. D. A. McDonald and Mr. Rae also did some work. The returns show a yield of 639 ounces from 641 tons of quartz.

Sherbrooke.—Operations in this district present few points of interest. The depression which characterised the season of 1884 has continued, the returns for the past year showing 1,238 ounces from 2,426 tons of quartz. Although several veins on the north dip have

been worked to a considerable depth, the belt hitherto operated is a narrow one, and it is to be hoped that fortunate discoveries may increase the width of productive ground. In view of the depth to which the northerly dipping veins have been followed, it hardly appears possible that the gold in the south dipping veins can be exhausted at the shallow depth to which they have been worked.

In the early part of the season Mr. Williams worked in the New York and Sherbrooke areas, and Mr. Cameron opened a small lead north of the former workings on the Wellington. The big pump was started to take out enough water to permit a test of a lead lying close to the Dewar. Work was also done on the Caledonia and Alexandria properties by Messrs. Brown, McNab and others. Mr. G. May did some work on the Meridian, in the old seven feet workings. On the Pactolus some work was done in the untried ground to the west of the open cut.

At Cochran Hill a little work was done by Mr. Cumminger, and in the fall Mr. R. P. Fraser repaired the mill at the Crow's Nest, and resumed work, and also tested several promising new leads.

STORMONT.—The Gallagher Gold Mining Company continued mining on the leads referred to in previous reports, but on a smaller scale. A lead was opened at the mouth of Country Harbor, and preparations made for systematic mining.

TANGIER.—This district has shown little improvement last year. In the spring some work was done by the Essex Company, and work was continued on Strawberry Hill by Mr. Townshend. Mr. J. Irvine continued working at Mooseland.

In the spring a little work was done on the Pittsburg area, and in the fall the discovery of a large and rich lead was reported from Clattenburg's Brook, West Tangier.

UNIACKE.—The returns show that 576 ounces were extracted from 2010 tons of quartz, an average of 5 7 dwts. Operations were continued by Mr. Davidson, Mr. Prince, and others, but no new work of interest was performed.

WAVERLEY.—In this district Mr. Huff continued prospecting, and in the fall opened a lead on American Hill, which promised well. Some work was done on the veins near the western mill.

UNPROCLAIMED, ETC.—At Wine Harbor, Mr. Colchester worked on a lead yielding about 15 dwts. to the ton.

YARMOUTH.—The Kemptville mines have been successfully operated during the past year, and the district has proved the most promising of any yet opened to the west of Halifax. The returns show 624 ounces from 133 tons of quartz.

Some work was also done at Pubnico, a trial lot yielding 64 ounces from 5 tons of quartz.

At Lake Catcha work was continued by the Oxford Company on the leads already opened, and leads in areas 227 and 228 were worked. Other parties are marking preparations for work, and it is anticipated that the year 1886 will show an improvement in the returns from this district.

At Millipsigate, Messrs. Hall and Owen, and others worked on leases 311, 282, and 284.

At Whiteburn (Caledonia), Queen's County, the Messrs. McGuire have opened up a lead on their property to a depth of about 20 feet, and have taken out some unusually rich quartz yielding at the rate of 17 ounces to the ton. They have made arrangements to put up a steam mill, and to begin regular work in the spring. Messrs. Hall, Owen, Barss, and Messrs. Cole, Telfer and Annand, prospected the ground north of McGuire's, and proved about ten gold bearing leads from 4 to 12 inches in width. Trial crushings of quartz from some of the larger veins showed 3 ounces to the ton. These leads will be worked in the spring. Prospecting was also carried on at Brookfield.

RAWDON.—Mr. McNaughton has continued working the Sims lead, which has been opened over a length of about 900 feet. The returns show 1,173 tons crushed for a yield of 2,759 ounces. Some prospecting was done in the vicinity of this mine, and there appears to be a large extent of auriferous ground in this district.

IRON MINING.

During the year 1885, the operations at the Mines of the Steel Company of Canada were continued as usual. Large quantities of the white "Spathose" ore were extracted from the west mines. Promising bodies of ore were opened up to the east of the Folly Mountain Mines.

At Bridgeville, on the East River of Pictou, further explorations were made on the Saddler area, by Mr. J. H. Bartlett and Mr. R. P. Fraser, of Pictou. Mr. William Grant also mined about 80 tons of limonite, part of which was shipped to the Londonderry furnaces.

GYPSUM.

Operations were continued as usual in the quarries in the Windsor district, but the exported tonnage was less than in the preceding year. The Messrs. McCurdy of Baddeck, shipped some plaster from St. Ann's Harbor, and some work was done by Mr. C. A. DeWolf, at the Lennox Passage quarries.

ANTIMONY.

The operations at the Rawdon Antimony Mine have been steadily continued during the year. A large and well timbered shaft has been sunk near the road, clear of the vein; and through it all future operations of pumping and winding will be carried on. The returns show that discoveries of Antimony ore are reported from Kentville, and from the Melrose district, Guysboro' County.

COPPER.

During the past season Mr. M. F. Egar did some work on a promising deposit of copper pyrites near Pinkietown, Antigonish County. Dr. Johnstone and Mr. J. McNeil proved some rich ore in the same locality.

At Coxheath, near Sydney, in Cape Breton County, the Coxheath Copper Company have had a line of railway six miles in length surveyed from the mine to Lime Point, on Sydney Harbor. Land has been secured and arrangements made for erecting a large establishment for treating their own and foreign ores, for conversion into matte. It is stated that contracts extending over terms of years, have been made, which guarantee abundance of ore in addition to the large amounts which recent exploratory work has shown in their own mine. Towards the close of the year more powerful pumping and winding gear were erected, and the compressed air drill plant enlarged to the dimensions originally contemplated, and the sinking of the shaft and extension of the preliminary levels vigorously pushed. It is confidently believed by the Directory of the Company that the essentials for the successful prosecution of a large copper reducing business exist at this point. Certainly the conditions of cheap fuel, limestone, iron ore, water carriage, etc., etc., cannot be surpassed. Trial runs made under the superintendence of Dr. Peters, the well known copper expert, with Coxheath ore, Reserve coke, and local fluxes of Sydney limestone and iron ore, gave the greatest satisfaction, yielding copper matte of excellent quality, with an insignificant loss of metal. The establishment of this undertaking would open a market for the many deposits of rich copper ores known in Antigonish, Pictou, Colchester and Cumberland Counties, which have not yet been worked.

MANGANESE.

Mr. J. W. Stephens continued working at Tenny Cape and Walton. The Messrs. Churchill are reported to have found good ore at Hantsport. Messrs. Thompson and Foster tested a bed of manganese ore near Kentville, which is stated to be suitable for making ferromanganese. On the Salmon River, near the Valley Station, work was continued by Messrs. Carter, Archibald and others, and about 60 tons of ore mined. The ore occurs as a gravel lying on sandstones in the vicinity of carboniferous limestones, and as irregular veins cutting the measures. The Hon. E. T. Moseley continued working at the Morrison mine at Salmon River, Cape Breton.

DEPUTY INSPECTORS' REPORTS.

DISTRICT OF PICTOU, COLCHESTER AND CUMBERLAND.

WESTVILLE, PICTOU CO., N. S.,
December 31st, 1885.

E. GILPIN, Esq.,
Inspector of Mines:

DEAR SIR,—I have much pleasure in forwarding you a condensed statement for the past year of my work as Deputy Inspector of Mines for the District of Pictou, Colchester and Cumberland.

VALE COLLIERY.

I was at this mine very frequently during the year, in all 22 times On February 10th, a serious explosion took place in the McBean Seam, by which thirteen men lost their lives and five were seriously injured. I was in Cumberland County at the time, and arrived at scene of disaster on the 12th, and remained for some length of time investigating the cause of the accident.

On April 6th I went down the McBean Seam to the point where the men had been working at the time of the explosion, and examined a hole at that point which was supposed to have been fired on the night of the explosion, and which some of the officials consider caused the explosion. The cause of the explosion at the Vale Colliery is a matter of dispute amongst experts, but the most reasonable solution appears to be as follows:—On the west side of the slope at 1300 feet level were two check doors, which, when shut, sent the air circulating down the slope, but if opened the air would rush to the upcast, as an exhaust fan is situated on that side, and thus the lower part of mine would be cut off from the air communication, which, if allowed for any length of time, would undoubtedly accumulate gas; from appearances, I would judge this to have transpired, and gas to have been generated in the manner supposed. Gas then having been driven down by the restored action of the air, was forced upon Foley's lamp. who was working in a head about 100 feet from sinking-face. He was burned almost to a crisp, whilst two-thirds of the men below him had scarcely a singed hair. Whilst sinking they drive leads east and west from back slopes, at intervals of about 60 feet, at right angles to slopes, which are cut again at the face coming up the hill with shoots. Heads driven up the hill off the air current, any distance, and left standing, will fill with gas; this has been an occurrence before the explosion and since, which would lead me to believe that the air current must

have in some way been tampered with, and the restored action resulted as I have stated. In support of this view, I would say that the timbers in the slopes from the head in which Foley worked "downward," that is toward the sinking face, gave unmistakable evidence that the explosion came from above, whilst the timber above this head gave like evidence that the explosion came from below, until it reached the 1800 feet level, which is some 400 feet above the head, then it expanded east and west, destroying the check-doors on the levels, and showing slight signs of the explosion for a distance of 200 or 300 feet in the levels inside the doors, which were from 70 to 100 feet off the slope. The stoppings between the main slope and back slopes from this level up to 1300 feet level were blown down. Strange to say, the first check door at 1300 feet level on west side was found standing open, whilst the inside door was destroyed. At this point there were men employed taking timber from the slope to some point inside of the doors. The explosion had gone in this level a distance of not more than 200 or 300 feet. The stoppings from 1300 feet level to mouth of slope were blown down and timber and debris were strewn in a confused way all through the slope.

The force of the explosion seems to have been spread over the area I have mentioned, viz., on the main slope and back slopes, and extending east and west from main slope a distance of from 200 to 300 feet, over which area the timber was in many cases blown down, and falls of roof took place, while the working faces on the east and west side of pit were free from any appearance of explosion, and in as good order after as before.

After the mine resumed work and the water was extracted, a hole was discovered at the working face of the sinking. The evidence brought to show that this hole was fired before the explosion, did not appear conclusive.

On November 26th, I experimented with dynamite in this mine, and believe that under favorable circumstances it might be used with advantage for some coal mining purposes.

HALIFAX COAL COMPANY.

Slopes Nos. 1 & 2.—During the year I visited those slopes 12 times. On my inspections I found that the management kept the mine in good order, and in compliance with the law. Gas during the entire year was to some extent given off in No. 2 slope.

McGregor Pit.—This mine was idle from and including June 3rd. I made several official visits, on which occasions, after travelling the working faces and airways, I found they were in satisfactory condition. In December I travelled the workings to the rise and found the airways, etc., in excellent condition.

ACADIA COAL COMPANY.

Acadia Colliery.—I made official visits to this mine 12 times during the year. Work was carried on to every appearance in a satisfactory and systematic manner. They have sunk the new lift a

distance of some 600 feet, making the total depth of this slope on the angle 3100 feet, or a vertical depth of 1307 feet. A pump of the Knowles pattern has been added to this mining plant, which is capable of performing all the duty required.

INTERCOLONIAL COAL COMPANY.

Nos. 1 & 2 Slopes were visited by me twelve times. During the summer a weight came on the pillars of the 1700 feet level which caused a creep, and in September, on my visit, I learned that the pillars, which were being extracted from three lifts, viz., on the 1000 feet, 1300 feet, and 1700 feet leads, were successfully extracted from the two first named, but owing to the creep on 1700 feet level, as large a percentage of coal could not be got from it as the others. In August the management ceased pumping at the Scott pit, which is sunk to the second seam. During the year gas was reported in pillar workings, upon which the use of powder was discontinued. I have found the air, as regards quantity, all that could be wished for, and the air passages kept clear.

Alexander Grant and John Muir have done a considerable amount of work on a seam of coal at Coal Brook, a short distance east of New Glasgow. They have erected a small winding engine and force pump. The coal in slope presents a troubled appearance, but in the bords driven eastwardly it is of a more regular form.

CUMBERLAND COUNTY, SPRING HILL MINES.

I visited these mines ten times during the year. On my visit in March there was some gas reported on the west side of west slope, the law was complied with and shot-firers appointed. In November the airways of west slope, which had become partially unsafe, were being retimbered, and in December I ascertained it was all in good condition. The South slope at this date was down a distance of 830 feet and sinking operations still continued. The coal has as good an appearance at this point as it had at the start. There is another seam of coal 11 feet thick, which presents a good appearance, underlying this seam. A small shaft is sunk on it, and considerable prospecting has been done with good results.

CHIGNECTO.

I visited this mine ten times during the year. This mine is in good order, and the air all that could be desired, but for some cause the mine has not been in very active operation during the year. But it is in order to make a large output of coal whenever it is requisite so to do.

JOGGINS.

I visited this mine ten times during the year, namely:—January 12, February 11, April 13, May 18, June 23, July 18, August 11, October 13, November 17, December . This mine has been idle for a good part of the year. I travelled working faces and airways, and found all in good order.

MILNER MINE.

John Hurley left this mine about the middle of the year, and Alexander Dewar had charge until about October. From 3 to 8 men were employed in it for the most part of the year. I have made ten official visitations to the works and found volume of air, etc., satisfactory. Since October Mr. Ripley has taken charge of this mine.

MINUDIE.

I paid ten visits to this mine during the past year. This mine has been doing a little for the most part of the year. The air is good. They still continue the long-wall system with fair results.

SCOTIA.

I visited this mine ten times during the year. On June 24th, at date of a visit, I found that fire had started on west side of new slope; in July it was to appearances extinguished, but I am strongly of opinion that it is there still. In August they had shut down the old slope and started to open up a new slope, and they completed this work in September, and since that date they have been taking out coal

S. E. Freeman in August commenced operations on the old Lawson mine, and has driven down the old slope sixty feet, and has since had a few men to work getting out coal.

SALTSPRINGS MINING CO.

This mine was also regularly visited by me. In January they had everything in preparation for sinking, and in March were down 137 feet, in April levels were driven off 140 feet. During my subsequent visits the mine was idle, and unfortunately the engine house was burned down in September, and from that time operations ceased.

WILLIAM PATRICK & CO.

In this mine in the summer Mr. Patrick started 2 or 3 men to work, and had been gradually increasing the number as the mine was opened up, until they had 9 or 10 men to work at the end of the year. The water is extracted from the works by means of a syphon. The seam is about 2 feet thick and of excellent quality.

The foregoing is a condensed statement of my work on the past year. I have likewise appended tables shewing the volume of air in each mine, the number of accidents, etc., etc.

Accidents during the year 1885, in the Pictou, Cumberland and Colchester Mines.

No	Date.	Name of Mine.	Person.	Occupation.	Remarks.
1	Feby. 10	Vale Colliery	John Campbell	Overman .	
2	"	" "	Neil McKinnon	Driver....	
3	"	" "	P. McBeth....	Stableman	
4	"	" "	H. Cameron ..	Pumpman.	
5	"	" "	D. Kennedy ..	Loader....	
6	"	" "	J. McLean....	Bottomer .	
7	"	" "	J. McEachern	do.	Killed by explosion.
8	"	" "	P. Foley......	Miner	
9	"	" "	T. Ryan......	Bottomer .	
10	"	" "	J. W. Fraser..	Miner	
11	"	" "	J. Grant......	do.	
12	"	" "	D. McNeil....	do.	
13	"	" "	Joe Haggart..	do.	
14	"	" "	A. McDonald..	....	
15	"	" "	J. Robertson..	....	
16	"	" "	J. Guthro ..	....	Injured by explosion.
17	"	" "	H. Lamont....	....	
18	"	" "	R. Love	....	
19	" 29	Acadia	Charles Reid....	Miner	Hands burned with gas.
20	April	Saltsprings..	Mike Murphy ..	do.	Collar bone broken.
21	" 28	Acadia	—— McDonald..	Driver....	Jammed with boxes.
22	May 16	Drummond .	Nor'an McKenzie	Cageman .	Jammed between prop and cage.
23	" 27	" .	—— Leadbeater	Driver....	Leg broke.
24	" 27	Spring Hill.	Angus McLeod..	Miner	Foot smashed.
25	Aug. 28	" .	Don'ld McDonald	do.	Legs broken; died in a few days after accident.
26	" 28	Spring Hill.	John Scully	do.	Killed; run over by cage.
27	Sept. 24	Vale	John Guthro....	do.	Burned with gas.
28	" 24	"	Charles Guthro..	do.	" "
29	" 25	"	John O. Hanley.	do.	" "
30	Oct. 8	Albion	James Ferguson.	Trapper...	Leg broke; empty rake on slope run over him.
31	Nov....	Patrick Mine	John McGilvray.	Miner	Leg broke riding on boxes.
32	Dec.....	Spring Hill.	—— Wilson	do.	Seriously burned by an explosion of powder.
33	Dec.....	" " .	—— Hoslem	do.	
34	Nov....	" " .	George Wallace..	do.	Arm broke by a piece of coal from the working face.

Table shewing the Quantities of Air in cubic feet per minute, as measured by me in the Cumberland and Pictou Collieries, during the year 1885.

COMPANY.	MINE.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Halifax Coal Co., Stellarton	McGregor Pit	59,691	59,010	67,449	72,708	76,298	76,790	Idle.	Idle.	Idle.	Idle.	Idle.	Idle.
	Slope No. 1	19,000	19,500	34,500	27,750	24,750	27,600	21,000	24,000	23,250	23,312	21,750	26,850
	Slope No. 2	21,000	21,250	27,720	28,000	25,920	23,040	21,600	22,320	23,760	24,060	18,000	24,480
Intercolonial Coal Co., Westville	Slope	67,000	92,500	90,000	96,900	96,000	95,000	89,400	91,000	88,220	99,050	97,900	95,000
Acadia Coal Co., Stellarton	Slope	60,000	61,200	71,000	63,500	54,120	65,000	54,100	62,000	61,500	52,800	64,700	64,850
Vale Coal Company	McBean Seam	Idle.	......	64,000	66,000	72,000	71,125	64,440	34,580	37,750	38,100	70,000	67,700
	Six Feet Seam	......	18,000	17,700	15,000	11,330	12,090	12,000	19,000	25,000	29,400	32,200	32,000
Spring Hill Coal Company	West Slope	17,550	......	31,500	34,800	15,600	15,000	14,900	17,000	21,150	25,570	24,800	29,000
	East Slope	35,200	......	22,000	14,700	33,000	32,000	32,600	31,000	30,000	31,408	32,520	31,600
	North Slope	Idle.	......	35,000	30,000	31,650	27,300	24,500	25,600	41,000	51,600	50,800	51,200
Chiegnecto	Slope—Chiegnecto	14,500	......	17,000	15,120	17,100	17,600	16,150	13,000	12,700	12,300	13,800	17,200
Minudie	Minudie	Idle.	4,000	......	4,800	5,000	5,400	4,000	3,600	......	5,000	5,750	6,200
Joggins	Slope	Idle.	Idle.	Idle.	18,240	19,700	21,200	2,200	13,960	......	12,200	13,300	Idle.
Boston Mining Company	Slope	3,200	Idle.	Idle.	4,000	4,500	5,000	4,050	7,000	......	5,050	4,000	4,700
Scotia	Slope	4,300	......	4,330	3,700	Idle.	......	......	5,000	......	7,000	6,500	7,100
Lawson	Slope	Idle.	Idle.	Idle.	Idle.	Idle.	Idle.	Idle.	Idle.	Idle.	1,200	2,000	3,000
Saltsprings	Slope	Idle.	......	3,700	4,800	Idle.	5,120	Idle.	Idle.	Idle.	Idle.	Idle.	Idle.
New Glasgow Coal Company	Slope	......	......	......	1,800	1,875	1,940	1,960	2,000	2,000	2,520	5,600	6,000
Patrick Mine	Slope	......	......	......	Idle.	Idle.	......	......	......	......	2,125	2,600	2,700

I remain, yours truly,

W. MADDEN, JR.,

Deputy Inspector of Mines.

CAPE BRETON.

BRIDGEPORT, *January 13th, 1886.*

E. GILPIN, ESQ.,

Inspector of Mines:

DEAR SIR,—I beg leave to hand you the following report as Deputy Inspector of Mines, of my work in the Island of Cape Breton for the year ending December 31st, 1885:

SYDNEY MINES.

I visited this mine fourteen times during the past year. On January 20th fire was discovered in some of the old workings on the north side of the pit towards the dip. It was thought at first that it could be extinguished in two or three days, but it spread rapidly through the workings in spite of every effort made to put it out. It was then deemed necessary to flood that district. About the 16th of March work was resumed, as is usual, on the south side of the pit, and also on the north side towards the rise. A number of men were engaged splitting and taking coal from the pillars. In the meantime the water in the burnt district was lowered considerably, so as to admit of the miners going to work again in the boards on the north side.

VICTORIA MINES.

This mine has worked very steady the past year, the levels have been extended, and counter levels driven parallel to them for the purpose of ventilation and drainage. A new landing has been made at the bottom of the east slope, which gives more room. The ventilation in this mine is much improved, the fan is capable of giving a much greater quantity than shown on the table, if required.

BARASOIS.

At this mine a new parallel slope is being driven on the west side of the one driven last year. As they are extended towards the dip, the coal seems to improve in quality very much. There has been a large engine brought to this mine for the purpose of pumping and hoisting coal, etc. It is now in course of erection.

LINGAN MINES.

In this mine I cannot notice any considerable change. The work was carried on in the usual way, except a new return air course through a portion of the lower workings. The water discharged from the colliery is pumped by three home manufactured pumps in three lifts, one delivering to the other. No. 1 discharging to a level that leads to the sea shore.

OLD BRIDGEPORT.

At this mine a new hoisting engine of 50 horse power has been put up; also bank and pully frames, screens, cages, and slides. In the pit the headways have been extended 468 feet towards the rise. The manager says that it is his intention this winter to drive one of these to the surface for a travelling road, and the other to a shaft to be sunk for a furnace. If this is done this colliery can be easily ventilated next season. There is no water pumped from this mine, as it runs to the sea shore through a water level. The workings are not yet driven below tide level.

INTERNATIONAL MINE.

At this mine the work under ground has been carried on as usual. The column pipes were replaced by new ones wherever required, and about 800 feet of piping was inserted. There is not as much water pumped from this mine as from most of the others, owing to a water level driven from the sea shore, which drains off the surface water between that and the crop of the coal. Also, there is no broken surface to the dip of this level.

RESERVE MINE.

At this mine the levels at the south side of the French slope have been extended, and an air shaft sunk on one of them; also, slants have been driven towards the dip. From North slants at six chains levels were broken off, and driven about two chains. From the south slants at ten chains bords have been broken off, but no levels driven yet. The drift has been driven from the Reserve to the Emery seam, and it is intended to sink an air shaft this winter on it.

CALEDONIA MINE.

At this mine a pair of slants have been driven on the west side of the shaft 500 feet to the dip. At 300 feet levels have been turned off right and left, and driven, and bords broken off, making two working sections in that district. The manager says that it is his intention to have those slants further driven this winter, to gain another lift. The pumps at this colliery are in two lifts or sets in the shaft, one pumping to the other.

LITTLE GLACE BAY MINES.

In the underground workings at this mine there has been no change made last year. The coal raised from the mine has been taken from bords already broken off. On the surface there has been a fine smokestack and six boiler seats built, and one new and two old boilers placed in. In a few days the other will be put in.

ONTARIO MINE.

At this mine the upper level has been timbered and cleared out to the face, and also a road laid in. The bords on the high side of this level have also been timbered, and crosscuts opened towards the furnace

for ventilation. The coal mined for the past season was taken out of this section.

BLOCK HOUSE MINE.

At this mine work has been rather dull. The coal mined for the past season was partly taken from pillars to the dip.

GOWRIE MINE.

In this mine there has been a pair of slants driven at the east side of the pit bottom fifteen chains and fifty links. Also the hanging roof along the main road has been down to make more room, and for the purpose of greater safety. A new engine, manufactured by the Ledgewood Manufacturing Company of New York, is being placed on the surface to haul the coal from the deeps. The pumps that are in the shaft are in two lifts ; they are the ordinary perpendicular lifting pumps, the same as at Caledonia, Little Glace Bay, and Sydney Mines.

I beg to enclose you in tabular form number of cubic feet of air measured by me on my visits, number of tons of water discharged, number of tons of coal raised, etc. Also, table of accidents and their causes during 1885.

In conclusion, I would like to draw your attention to one particular thing, that is, the careless manner in which miners load horizontal holes bored in rock. It often happens that the holes are three-cornered, and during loading some of the powder remains in the lower groove, and is very often ignited by the stemmer. Such was the case with John Peck at Sydney Mines last year, and two others injured at the International in 1884.

Report of Accidents in Cape Breton Mines during 1885.

Date of Accident.	Name of Mines.	Name.	Occupation.	Remarks.
April 18	Reserve	Michael McMullin........	Miner	Fall of coal from face.
May 28	Sydney Mines ..	John Peck..............	Miner	Explosion of gunpowder, blasting rock.
June 25	Sydney Mines ..	Thomas Mahar..........	Labourer....	Run over by full trip on engine plane.
"	Sydney Mines ..	Neil McInnis............	Labourer....	" " " "
August 5....	Little Glace Bay	Hugh Campbell..........	Miner	Collar bone broken by fall of coal from face.
September 3.	International....	Duncan Curry	Miner	Leg fractured by fall of coal from face.

Report of No. of cubic feet of Air passing through Mines in Cape Breton for 1885.

Name of Mine.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Sydney Mines	10,000	10,000	25,230	31,325	36,000	40,000	......	34,000	47,260	46,350	55,000	43,986
Victoria	19,320	19,000	18,000	19,200	15,580	20,000	28,850	28,000	31,370	.....	36,540	40,000
Barrasois	......	......	......	......	......	......	......	......	......	......	......	5,000
Lingan	12,000	21,000	21,500	25,000	20,000	19,600	......	18,000	21,500	......	20,270	21,000
Bridgeport	......	......	3,000	3,400	......	4,150	1,600	1,500	3,000	......	5,000	5,000
International	......	......	......	28,800	31,000	27,500	......	28,500	26,000	......	28,830	20,000
Reserve....................	20,000	......	......	16,300	26,000	27,400	30,000	22,000	24.300	......	31,394	28,000
Caledonia	1,500	......	4,612	27,300	28,000	32,200	34,640	36,000	37,734	30,523	29.000	7,500
Little Glace Bay...........	......	......	13,000	6,000	6,500	7,000	......	9,230	14,000	9,000	9,750	10,000
Ontario....................	......	......	3,500	5,000	3,000	2,500	4,000	4,000	8,700	6,600	......	5,500
Block House................	......	......	......	17,500	18,000	......	......	10,000	......	......	......	18,000
Gowrie	......	15,000	......	22,500	20,000	19,500	16,500	20,000	24,130	20,000	25,300	......

I remain, yours truly,

PATRICK NEVILLE,

Deputy Inspector of Mines.

Average weight of Water pumped during year ending Dec. 31st, 1885, compared with the weight of Coal raised during the same period.

NOVA SCOTIA.

COMPANY.	MINE.	APPLIANCES.	Gallons of Water per 24 hours.	Tons of Water raised year 1885.	Tons of Coal raised year 1885.
Intercolonial Coal Company	Nos. 1 and 2 slopes	1 No. 2 Cameron Pump. 1 Nos. 3 and 4 Cameron Pump 1 No. 3 do. do 1 Knowles Independent Condenser	35,000	63,875	109,139
Acadia Coal Company	One Slope	Knowles Pump	86,400	157,680	98,150
Vale Coal Company	McBean seam, one slope.	1 Knowles Steam Pump 1 Cameron Pump	25,200	45,990	76,125
	Six feet seam, one slope	1 do. do. 1 Blake do.	10,800	19,710	
Halifax Coal Company	Douglas seam, slopes 1 and 2	Water hoisted with Boxes	15,600	28,470	129,195
	McGregor seam, shaft	No. 8 Cameron Pump	19,104	34,864	
	Foord Pit	Hoisted with Iron Tanks	1,056,000	(Ran only a portion of year.)	
Cumberland Railway & Coal Co., Spring Hill Mines.	East Slope. West Slope.	2 Blake Pumps 2 Cameron do. 2 Allison do.	307,627	561,419	335,055
Montreal and New Glasgow	....	....	....	....	20,210
Joggins Mines	One Slope.	1 Burrel-Johnston Pump	23,142	42,234	17,664
Milner	....	....	....	....	200
Chignecto	Slope	Cameron Pump.	14,400	26,280	6,084
Boston Mining Co.	Slope	Water level of this mine worked along out-crop of seam	Unknown	....	......
Scotia	Slope	Same as preceding	Unknown	....	1,318
Minudie	Slope	No. 4 Cameron Pump.	17,666	32,240	7,702
Lawson Mine, *per* S. E. Freeman	Slope	Hoisted by Boxes	7,200	3,312*	115
W. Patrick & Co	Slope	Syphon	9,600	17,520	485

* This is for October, November, December, 1885.

CAPE BRETON.

Collieries.	No. of Pumps.	Name and style of Pump.	Average gallons discharged per day.	Tons of Water raised during 1885.	Tons of Coal raised during 1885.
Sydney Mines	2	Double Acting	172,620	261,278	125,033
	2	Lifting Pump	139,863	227,901	
Victoria	2	Double Acting	142,380	232,003	47,614
Lingan	3	Built to order	80,124	131,056	21,761
International	2	Cameron	7,275	117,885	67,959
Reserve	2	Cameron, No. 6	115,984	334,000	83,276
		" " 5	124,500		
Caledonia	2	Lifting Pumps	86,400	170,785	58,859
Little Glace Bay	1	No. 6 Cameron	205,384	334,678	39,400
	2	Lifting Pumps			
Block House	3	Knowles	648,720	268,457	11,075
		Built to order	139,984		
		" "	139,984		
Gowrie	1	Knowles' Special	328,264	535,252	74,414
	2	Built to order			
Barasois	......	Sinking	....	....	130
Old Bridgeport	......	Natural drainage	....	....	13,178
Ontario	......				7,779
		Totals	....	3,646,889	1,352,205

LIST OF MINERAL LEASES (OTHER THAN GOLD).

No.	Lessee.	District.	Area, Sq. Miles.
	COPPER.		
	ANTIGONISH COUNTY.		
2	Ross, McKay, and others		1
	COLCHESTER COUNTY.		
	Moir, Wm. C., et al	Tatamagouche	10½
	CAPE BRETON COUNTY.		
105	Burchell, J. E		1
106	Burchell, G. L., and others		1
95	Coxheath Mining Co		1
104	McKenzie, H. R., et al		1
94	McKenzie & McKim		1
	HALIFAX COUNTY.		
1	McClure, Chas. F	Gay's Rivor	1
	IRON.		
	PICTOU COUNTY.		
44	Hudson, James	East River	1
43	Hudson, James	" "	1

Total area under lease 19½ square miles.

LIST OF MINERAL LEASES (OTHER THAN GOLD).—*Continued.*

No.	Lessee.	District.	Area, Sq. Miles.
	IRON.—(CONTINUED).		
	CAPE BRETON COUNTY.		
86	Brookman, S., et al	N. Side East Bay	1
91	Brookman, S. L.	East Bay	1
93	Brookman, S., et al	" "	1
102	C. L. Ingraham	" "	1
103	A. McKenzie, et al	" "	1
92	Matheson, D., et al	" "	1
84	Protheroe, Pryse	Cow Bay	1
	INVERNESS COUNTY.		
16	Inverness C. I. & R. Co.	Whycocomagh	1
	Total area under lease		$27\frac{1}{2}$ square miles.

LIST OF COAL LEASES.

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		ANTIGONISH CO.				
1	McKinnon, et al.		3			
		CUMBERLAND CO.				
13, 14, 15	Black, C. H. M.		3			
21	Bligh, James, et al.		1			
47	Boston, C. M. Co.		1	....	John Moffat	River Herbert
25	Campbell, Alex., et al.		1			
	" " "		2			
32, 34	" " "		4			
35, 48, 49, 50	Campbell, John		8			
31, 33, 37, 38, 40, 41, 45, 46	Campbell, W.		1			
54	Cumberland C. M. Co.	Chignecto	4	Working.	*Jas. Baird*	Maccan.
12 6, 7, 8, 44, 52, 55	Cumberland R'y & Coal Co.	Springhill	9	Working.	R. G. Leckie *W. Hall*	Springhill.
17	Domville, James		3	....	E. N. Sharp	St. John, N.B.
	Joggins C. M. Association	Joggins	2	Working.	*P. McNaughton*	Joggins.
	Joggins C. M. Co.	Cumberland	2			
20, 42	Macfarlane, A.		2			
18, 19	Livesey, John		2			
5	Lawson C. M. Co.	Maccan	1			
51, 53	Milner, Christopher		2			
1, 2, 3, 4	New York & Acadia Co.	Scotia	4	Working.		Maccan.

16	Seaman, Gilbert		1	Working.	*M. Dunlop*	River Herbert
24	Shannon, S. L.		2			
36, 39	Shannon, S.L. (in trust) et al		2			
22, 23, 28, 29, 30	Styles Mining Co. (Ltd.)		5	....	J. S. Hickman	Amherst.
9	Victoria Coal Mining Co.		2			
26, 27	Wright, John V.		3			
			65			
		PICTOU CO.				
1	Acadia Coal Co.	Fraser	1	Working.	H. S. Poole	Stellarton.
3	" "	Acadia	1	"	*J. Maxwell*	Westville.
42	" "	Pictou	4	....		
23	Allan, Sir Hugh, K't.	Vale	3	Working.	J. B. Moore *T. Turnbull*	New Glasgow. Vale Colliery.
10	Gray, B. G., et al		1			
11	Halliburton, R. G., et al		1			
	Halifax Co., (Ltd.)	Albion	4	Working.	S. Cunard & Co *J. Rutherford*	Halifax. Stellarton.
13, 14	Intercolonial Coal Co.		2			
12	" "	Drummond	1	Working.	Robert Simpson	Westville.
6	Kirby, Lewis R.		1			
15, 30, 31	Merigomish Co.		3			
25	Nova Scotia Co.	Black Diamond	4	....	M. H. Angell	Westville.
24	Richey, M. H.		1			
			27			

LIST OF COAL LEASES.—(CONTINUED).

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		CAPE BRETON CO.				
3	Archibald, Blowers	Gowrie	1	Working.	Archibald & Co.	North Sydney
					Chas. Archibald.	Cow Bay.
2	Archibald, Thomas D....	"	1			
5, 28	Blockhouse Mining Co....	Blockhouse......	2	Working.	R. Belloni	Cow Bay.
29	" *(sea area)*..	....	1			
72	Brookman, Samuel	....	1			
76, 77	" S., et al......	....	2			
15	Caledonia, C. & R. Co....	Caledonia	1	Working.	David McKeen...	Glace Bay.
31	" *(sea area)*..	....	1			
30	Campbell, Alex..........	....	1		T. D. Archibald...	North Sydney
8, 9	Halifax Coal & Iron Co..	Ontario	$1\frac{1}{2}$	Working.	*Jno. Sutherland..*	Pt. Caledonia.
87	Cossit, Geo. G..........	....	1			
	General Mining Association	Bridgeport......	2		Rich. H. Brown.	Sydney Mines
27	" " "	Sydney	18	Working.	Cunard&Morrow	Halifax.
	" " *(sea area)*..	"	4		H. Mitchell....	Bridgeport.
	Low Point, Barasois, and..	Lingan	13	Working.	*Donald Lynk....*	Low Point.
38, 39	Lingan Mining Co., (Ltd.)	"	10			
10, 21	Gibson, John, et al......	....	2			
4, 12, 16	Glace Bay Mining Co....	Glace Bay	3	Working.	E. P. Archbold.	Halifax.
					Chas. Rigby....	Lt. Glace Bay.
75	Henry, W. A............	....	1			
22	Ingraham, J. L..........	Halfway........	1			

6, 13, 18, 19	International Coal Co., Ltd.	International	4	Working.	*P. Johnstone*	Bridgeport.
71	Jennings, Edward		1			
47	LeCras & McInnes		1			
66	Merchants' Bank of Canada.	Gardener	2			
74	Moore & Moseley		$1\frac{1}{4}$			
101	McDonald, W. B		1			
52, 53	McLeod, Hugh		2			
88, 89, 90	Paint, Henry N., and others		3			
83, 85	Protheroe, Pryse		2			
73, 82	Reid, Thos. S. *(sea area)*		2			
40, 41, 42	Ross, H. E., et al		3			
79	Ross, W. J., et al *(sea area)*		1			
43	South Head Coal Co	South Head	1			
32	Sword, Wm. *(sea area)*		3			
23, 25, 70	Sydney & Louisburg Coal &					
14, 24	R. R. Co., Ltd	Schooner Pond	10	Working.	F. C. Kimber	Sydney.
49	" " "	Reserve			*W. Routledge*	Reserve Mines
64, 65, 68	" " "	Lorway				
69	" " "	Emery				
54 to 63	Sydney C. M. Co. *(sea areas)*		10			
46	Toronto Coal Co	Collins	1			
67	Weatherbe & Kirby		1			
78	Weatherbe, R. L. *(sea area)*		5			
96, 97, 98, 99, 100	Low Point, Barasois and Lingan Mining Co., Ltd		5			
	" *(sea areas)*		2	Working.	D. Lynk	Low Point.
			$128\frac{3}{4}$			

LIST OF COAL LEASES.—(CONTINUED.)

No.	Lessee.	Colliery.	Area Sq. Miles.	Working.	Agent and *Manager*.	Postal Address.
		INVERNESS CO.				
5	Aylmer, John Evans Freke.	Cape Mabou	2			
8	Evans, Thomas..........	Chimney Corner.	1		T. Evans........	Chimney Cor.
9	Evans, Thomas *(sea area)*	....	1			
7, 12	Inverness C. I. & R. C....	....	2		Alex. Wright....	Moncton.
13	McGregor, J. D..........	Port Hood......	3			
4	Richey, M. H., et al......	....	1			
11	Ross, W. J..............	Broad Cove	1			
6	Ross, H. E., et al *(sea area)*	....	1			
14, 15	Smyth, Peter............	....	2			
10	Tremaine, E. D., *(sea area)*	....	1			
17	McDonald, Hugh	....	1			
			16			
		RICHMOND CO.				
2	Victoria Oil and Mining Co.	Little River	1			
			1			
		VICTORIA CO.				
2	Kenny, T. E............	New Campbellton	3			
3, 4, 5	Ross, William	Black Rock	5			
			8			

Total area under lease .... $245\frac{3}{4}$ square miles.

TABLE A.—COAL TRADE BY COUNTIES.

	Cumberland.		Pictou.		Cape Breton		Other Counties.		Total.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter	57,102	49 787	92,726	69,168	29,979	6,396	....	....	179,807	125,351
2nd Quarter	98,512	91,238	110,780	97,575	162,705	120,700	....	....	371,997	309,513
3rd Quarter	101,220	95,605	130,860	137,132	237,100	278,050	....	....	469,180	510,787
4th Quarter	112,089	103,905	98,453	92,125	118,694	112,829	....	....	329,236	308,859
Total	368,923	340,535	432,819	396,000	548,478	517,975	....	....	1,350,220	1,254,510
1884	279,946	258,405	511,193	464,181	598,156	539,064	....	....	1,389,295	1,261,650
1883	247,861	222,347	505,626	461,809	668,293	612,614	773	753	1,422,553	1,297,523
1882	243,284	218,349	480,953	446,137	641,151	585,568	423	125	1,365,811	1,250,179

TABLE B.—COAL TRADE BY COUNTIES.

	Cumberland.			Pictou.			Cape Breton.			Other Counties.			Totals.			Grand Total.
	Round.	Slack.	Run of Mine.	Round.	Slack.	Run of Mine.	Round.	Slack.	Run of Mine.	Round.	Slack.	Run of Mine.	Round.	Slack.	Run of Mine.	
Nova Scotia Land Sales	24,431	37,704	19,507	98,093	65,658	2131	2305	5892	87	....	....	....	124,829	109,254	21,725	255,808
Sea borne	1571	740	....	33,380	10,066	....	129,914	12,919	254	....	....	....	164,865	23,725	254	188,844
Nova Scotia, total	26,002	38,444	19,507	131,473	75,724	2131	132,219	18,811	341	....	....	....	289,694	132,979	21,979	444,652
New Brunswick	37,616	22,362	32,892	25,573	1693	....	28,163	335	....	....	....	....	91,352	24,390	32,892	148,634
Newfoundland	....	....	....	4468	21	....	69,123	710	....	....	....	....	73,591	731	....	74,322
P. E. Island	....	....	....	13,316	25,841	....	10,988	2625	....	....	....	....	24,304	28,466	....	52,770
Quebec	17,360	20,095	125,845	114,697	666	....	151,166	16,348	47,740	....	....	....	283,223	37,109	173,585	493,917
West Indies	....	....	....	99	15	....	5618	....	....	....	....	....	5717	15	....	5732
United States	412	....	....	283	....	....	9802	23,986	....	....	....	....	10,497	23,986	....	34,483
Other Countries	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	81,390	80,901	178,244	289,909	103,960	2131	407,079	62,815	48,081	....	....	....	778,378	247,676	228,456	1,254,510
1884	155,999	102,406	....	330,309	133,872	....	459,210	79,845	....	....	....	....	945,518	316,132	....	1,261,650
1883	152,453	69,894	....	319,859	141,950	....	543,419	69,195	....	687	66	....	1,016,418	281,105	....	1,297,523
1882	151,281	67,068	....	329,350	116,787	....	522,325	63,245	....	125	....	....	1,003,079	247,100	....	1,250,179

COAL.—SALES.

MARKETS.	1st Quarter.	2nd Quarter.	3rd Quarter	4th Quarter.	Year 1885.	Year 1884.
N. Scotia.						
Land Sales.	69,824	61.461	54,578	69,945	255,808	266,475
Sea borne..	6,720	43,706	91,998	46,420	188,844	226,575
N. Scotia—T'l	76,544	105,167	146,576	116,365	444,652	493,050
N. Brunswick	17,574	35,911	45,182	49,967	148,634	158,420
Newfoundl'd..	84	12,253	36,337	25,648	74,322	86,216
P. E. Island..	....	13,747	28,118	10,905	52,770	50,399
Quebec	30,738	135,446	233,764	93,969	493,917	396,782
West Indies..	245	675	774	4,038	5,732	9,595
United States	166	6,314	20,036	7,967	34,483	64,515
Other Conntries....	......	....	....	....	....	2,673
Total....	125,351	309,513	510,787	308,859	1,254,510	1,261,650
1884..	138,303	307,915	486,601	328,821	1,261,650	1,297,523
1883..	141,994	325,153	498,913	331,463	1,297,523	1,250,179

COAL.—GENERAL STATEMENT.

1885.	Produce.	Sales.	Colliery Consumption.
1st Quarter ....tons	179,807	125,351	30,862
2nd Quarter .... "	371,997	309,513	28,477
3rd Quarter .... "	469,180	510,787	31,912
4th Quarter .... "	331,221	308,859	36,373
Total..........	1,352,205	1,254,510	127,624
1884	1,389,295	1,261 650	116,769
1883	1,422,553	1,297,523	111,949
1882	1,365,811	1,250,179	111,381

COAL PRODUCE OF NOVA SCOTIA DURING THE YEAR ENDED DECEMBER 31ST, 1885.

Collieries.	Seams.	Produce.	Sales.					Colliery Consumption.		
			Round.	Slack.	Run of Mine.	Total.	Per cent.	Engines.	Unknown.	Per cent.
Cumberland Co.										
Chignecto	North	6,084	3,359	1,409		4,768	78	1,262	179	23
Joggins	Joggins	17,664	11,473	3,157		14,630	82	2,492	327	15
Milner		200	51			51	25			
Minudie		7,702	6,493	627		7,120	92	500	172	8
Patrick		485	383	102		485				
Springhill	North, Main and South.	335,055	58,171	75,375	178,244	311,790	93	16,057	3,360	5
Salt Springs		400	75	153		228	70	160	4	40
Scotia	North	1,318	1,270	78		1,348	100			
Lawson		115	115			115	100			
Pictou Co.										
Acadia	Acadia	98,150	58,791	31,637		90,428	92	5,237	2,083	7
Albion	Third and McGregor	129,195	74,395	37,535	2,131	114,061	88	11,847	4,196	12
Intercolonial	Acadia	109,139	75,435	22,442		97,887	89	6,412	2,690	8
New Glasgow *		200								
Vale	McBean and Six Feet	96,135	76,288	12,346		93,634	92	12,464	1,542	14
Cape Breton Co.										
Barasois	Lingan	130	10			10	8			
Bridgeport	Phelan	13,178	11,953	630		12,583	95	63	33	7
Blockhouse	Blockhouse	11,075	7,316			7,316	66	2,000	710	25
Caledonia	Phelan	58,859	39,024	9,527		48,551	82	1,123	1,136	3
Francklyn	Sydney	759	136	623		759				
Glace Bay	Harbor	39,400	31,351	4,218	5,420	40,989		2,927	1,295	10
Gowrie	Gowrie	74,414	57,718	13,024	6,838	77,580		2,040	2,130	5
International	Harbor	(?)67,959	45,634	6,028	35,823	87,485		1,915	1,338	4
Lingan	Lingan	21,761	17,233	1,634		18,867	86	2,381	1,319	17
Ontario	Phelan	7,779	7,293	152		7,445	95	92	236	4
Reserve	Harbor	83,276	59,644	12,903		72,547	86	4,408	3,516	9
Sydney	Sydney	124,274	95,727	8,190		103,917	83	13,639	6,694	16
Victoria	Victoria	47,614	34,040	5,886		39,926	83	5,719	928	13
		1,352,203	778,378	247,676	228,456	1,254,510		93,736	33,888	

* Further returns show 431 tons raised and 295 tons sold last quarter, 1885.

COLLIERY CONSTRUCTION ACCOUNT.—1885.

COLLIERIES.	Shafts.	Slopes.	Adits.	Machinery.	Colliery Buildings.	Dwellings.	Surface Works.	Railways.	Wharves.	Prospecting	Total.
CUMBERLAND COUNTY.											
Chignecto											
Joggins	$275 00				$750 00						$ 1025 00
Lawrence											
Milner		$200 00	$198 00				$ 80 00	$100 00			578 00
Minudie		411 00	42 00	$ 481 00		$83 00	634 00		$85 00	$574 00	2310 00
Saltsprings											
Wm. Patrick	40 00	660 00	150 00	120 00			275 00				1245 00
Springhill				9000 00	3334 00		4845 00	360 00		2454 00	19993 00
PICTOU COUNTY.											
Acadia				3263 00							3263 00
Albion											
Intercolonial				1670 00	715 00						2385 00
Vale				3000 00		3000 00					6000 00
New Glasgow		500 00	500 00	800 00	75 00		150 00				2025 00
CAPE BRETON.											
Barrasois		899 00		1143 00							2042 00
Bridgeport	90 00		275 00	754 00	230 00	800 00	770 00	156 00			3075 00
Blockhouse											
Caledonia		1035 00	1141 00	1116 00				405 00	644 00		4341 00
Glace Bay			52 00	1067 00							1119 00
Gowrie			1416 00	3600 00							5016 00
International					896 00						896 00
Lingan			532 00								532 00
Ontario			152 00	15 00							167 00
Reserve	45 00	6240 00	64 00	371 00	776 00	1457 00	922 00				9875 00
Sydney				608 00							608 00
Victoria		438 00	7800 00	87 00	298 00	4070 00	82 00				12775 00
Total	$450 00	$10383 00	$12322 00	$27095 00	$7074 00	$9410 00	$7758 00	$1021 00	$729 00	$3028 00	$79270 00

COLLIERIES.	Underground.				Surface.				Construction.				Total.					Horses.		Pits Worked.
	Skilled Laborers.	Laborers.	Boys.	Days' Labor.	Skilled Laborers.	Laborers.	Boys.	Days' Labor.	Skilled Labor.	Laborers.	Boys.	Days' Labor.	Persons.	Days' Labor.	Average No. of tons, per Cutter.	Average tons per day, per Cutter.	Average quantity raised per day.	Above.	Below	Days.
Cumberland Co.																				
Chignecto	7	2	2	2,854	1	5	1	2,243	....	....	....	.....	18	5,097	869	3	23	1	1	260
Joggins	34	7	7	7,603	8	23	7	7,976	2	....	....	108	88	15,687	518	4	104	3	2	126
Minudie	18	7	3	5,476	5	5	2	2,907	1	1	....	260	42	8,643	427	1	32	1	1	234
Salt Springs	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	.....	.....	.....	....	....	....
Spring Hill	292	153	99	142,875	45	92	17	40,361	9	11	1	4,828	719	188,064	1,147	4	1,288	8	28	260
Patrick	2	1	....	729	1	1	1	735	1	....	....	200	7	1,664	.....	.....	1	1	....	287
Maccan	2	....	....	181	....	....	....	....	....	1	....	86	3	267	121	.....	.....	1	....	60
Scotia	3	....	....	405	1	1	1	174	....	....	....	.....	6	579	439	3	9	1	....	132
Lawson	1	1	1	360	1	....	1	150	....	....	....	.....	5	510	115	.....	.....	2	....	....
Pictou Co.																				
Acadia	91	91	25	47,616	20	40	6	18,527	....	....	....	.....	273	66,143	1,078	5	415	8	5	212
Albion	200	110	59	76,861	66	101	34	54,335	....	....	....	.....	570	131,196	645	2	520	17	13	248
Intercolonial	126	50	61	53,495	31	56	9	26,057	2	1	....	574	336	80,126	866	4	532	7	15	205
Vale	217	81	16	74,993	50	104	6	40,986	....	....	....	.....	474	115,979	350	1	338	3	11	225
New Glasgow	2	1	1	973	1	....	....	357	1	....	....	30	6	1,360	.....	.....	.....	....	....	....
Cape Breton Co.																				
Barasois	....	2	1	729	....	1	....	148	....	1	....	62	5	939	.....	.....	.....	....	....	....
Blockhouse	24	2	14	4,775	10	20	3	7,862	....	....	....	.....	73	12,637	461	4	119	5	6	93
Bridgeport	17	1	4	4,399	2	2	1	1,451	3	3	1	858	35	6,708	775	6	116	1	1	113
Caledonia	70	5	18	15,561	12	20	10	9,623	15	1	4	3,358	155	28,542	840	5	392	6	13	150
Francklyn	7	1	3	444	2	2	1	200	....	....	....	.....	16	644	.....	.....	.....	1	....	....
Glace Bay	71	6	15	10,985	29	21	2	13,660	....	....	....	.....	144	24,645	555	4	285	6	14	138
Gowrie	108	12	37	24,947	18	38	14	15,478	....	....	....	.....	227	40,424	688	6	670	8	17	111
International	94	20	32	9,461	21	41	2	9,525	....	....	....	.....	210	18,986	744	5	530	2	19	128
Lingan	48	4	13	11,709	2	21	10	8,191	....	....	....	.....	98	19,900	453	2	128	3	8	169
Ontario	20	1	6	3,983	1	7	1	1,610	....	....	....	.....	36	5,593	388	3	66	2	2	117
Reserve	116	12	33	31,529	14	22	8	10,162	5	3	....	2,425	213	44,116	717	5	616	8	12	135
Sydney	210	41	83	68,589	60	81	40	47,232	....	....	....	.....	515	115,821	591	3	664	8	26	187
Victoria	83	23	7	28,967	8	42	5	16,407	....	....	....	.....	168	45,374	573	1	159	4	3	298
Inverness Co.																				
Chimney Corner	2	1	....	....	1	....	....	....	....	....	....	.....	4	....	.....	.....	.....	1	....	....
	1865	635	540	630,499	410	747	182	336,357	39	22	6	12,789	4,446	979,645	1,015	3	7,043	108	197	3,888

Nova Scotia Coal Sales, from 1785 to 1885 (inclusive.)

Year.	Sales.	Total.
1785	1,668	
1786	2,000	
1787, 1788, 1789, 1790	10,681	14,349
1791	2,670	
1792	2,143	
1793	1,926	
1794	4,405	
1795	5,320	
1796	5,249	
1797	6,039	
1798	5,948	
1799	8,947	
1800	8,401	51,048
1801	5,775	
1802	7,769	
1803	6,601	
1804	5,976	
1805	10,130	
1806	4,938	
1807	5,119	
1808	6,616	
1809	8,919	
1810	8,609	70,452
1811	8,516	
1812	9,570	
1813	9,744	
1814	9,866	
1815	9,336	
1816	8,619	
1817	9,284	
1818	7,920	
1819	8,692	
1820	9,980	91,527
1821	11,388	
1822	7,512	
1823, 1824, 1825	27,000	
1826	12,600	
1827	12,149	
1828	20,967	
1829	21,935	
1830	27,269	140,820
1831	37,170	
1832	50,396	
1833	64,743	
1834	50,813	
1835	56,434	
1836	107,593	
1837	118,942	
1838	106,730	
1839	145,962	
1840	101,198	839,981
1841	148,298	Forw'd 1,208,177
1842	129,708	
1843	105,161	
1844	108,482	
1845	150,674	
1846	147,506	
1847	201,650	
1848	187,643	
1849	174,592	
1850	180,084	1,533,798
1851	153,499	
1852	189,076	
1853	217,426	
1854	234,312	
1855	238,215	
1856	253,492	
1857	294,198	
1858	226,725	
1859	270,293	
1860	322,593	2,399,829
1861	326,429	
1862	395,637	
1863	429,351	
1864	576,935	
1865	635,586	
1866	558,520	
1867	471,185	
1868	453,624	
1869	511,795	
1870	568,277	4,927,339
1871	596,418	
1872	785,914	
1873	881,106	
1874	749,127	
1875	706,795	
1876	634,207	
1877	697,065	
1878	693,511	
1879	688,628	
1880	954,659	7,377,428
1881	1,035,014	
1882	1,250,179	
1883	1,297,523	
1884	1,261,650	
1885	1,254,510	6,098,876
	Total...	23,545,447

SUMMARY.

1785 to 1790	14,349	1831 to 1840	839,981
1791 to 1800	51,048	1841 to 1850	1,533,798
1801 to 1810	70,452	1851 to 1860	2,399,829
1811 to 1820	91,527	1861 to 1870	4,927,339
1821 to 1830	140,820	1871 to 1880	7,377,428

COAL.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	118,173	24 ad.	1868	228,132	$1 25
1851	116,274	"	1869	257,485	"
1852	87,542	"	1870	168,180	"
1853	120,764	"	1871	165,431	"
1854	139,125	Free	1872	154,092	75
1855	103,222	"	1873	264,760	"
1856	126,152	"	1874	138,335	"
1857	123,335	"	1875	89,746	"
1858	186,743	"	1876	71,634	"
1859	122,720	"	1877	118,216	"
1860	149,289	"	1878	88,495	"
1861	204,457	"	1879	51,641	"
1862	192,612	"	1880	123,423	"
1863	282,775	"	1881	113,728	"
1864	347,594	"	1882	99,302	"
1865	465,194	"	1883	102,755	"
1866	404,252	"	1884	64,515	"
1867	338,492	$1 25	1885	34 483	"

NOTE.—The quantities given for the years 1850 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably under estimated.

GOLD.—GENERAL STATEMENT FOR THE YEAR 1885.

Shewing the number of Mines, Days' Labor performed, quantities of Quartz crushed, yield of Gold, &c., for the year ended December 31st, 1885.

DISTRICTS.	Number of Mines.	Days' Labor.	Mills.	Steam Power.	Water Power.	Quartz, etc., crushed.	Yield per Ton.			Maxim Yield per Ton.			Total Yield of Gold.			Average yield per man per day for 12 months at $18.00 per oz.
							Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Caribou	3	8355	2	1	1	2239	0	11	9	1	18	0	1335	14	11	2.87
Darr's Hill	1	31713	1	....	1	10880	0	9	0	1	10	0	4924	0	0	3.10
Fifteen Mile Stream	1	2479	2	....	2	898	0	9	4	0	17	0	424	15	6	3.08
Montagu	2	18908	1	1	....	2809	1	8	4	19	17	0	4001	6	2	3.80
Oldham	3	11777	1	....	1	1170	2	0	0	62	10	0	2360	12	5	3.60
Renfrew	2	5542	2	....	2	641	0	19	9	1	15	4	639	10	0	2.07
Sherbrooke	6	16050	2	1	1	2426	0	10	2	1	16	6	1238	11	0	1.38
Stormont	1	5891	1	1	....	707	1	4	0	1	9	21	863	15	10	2.63
Tangier	2	13729	2	2	....	874	0	9	9	0	17	6	431	9	14	0.56
Uniacke	2	4473	3	3	....	2010	0	5	7	1	11	0	576	0	12	2.31
Waverley	1	1135	1	1	....	223	0	15	2	1	0	0	170	2	6	2.68
Unproclaimed	5	38504	7	4	3	4013	1	6	1	12	16	0	5237	16	2	2.47
Total	29	157421	25	14	11	28890	0	15	4	62	10	0	22203	12	20	2.54

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

Month.	Carribou.							Darr's Hill.							Fifteen Mile Stream.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	2	784	31	138	62	19	0	1	2290	91	900	189	0	0	1	18	...	74	34	10	0
February	2	845	34	....	..	..	..	1	2319	92	860	215	0	0	1	79	3	88	58	0	0
March	3	395	16	130	39	7	12	1	2500	100	960	260	0	0	2	204	8	56	24	0	0
April..........	2	622	25	78	35	2	12	1	2342	92	856	247	0	0	2	186	7	167	63	10	0
May	3	1192	47	373	177	2	0	1	2317	91	843	414	0	0	1	225	9	270	116	10	0
June	3	805	33	104	45	13	0	1	2619	104	875	356	0	0	2	200	8	....	....	..	..
July	4	1183	47	146	89	4	1	1	2450	98	965	304	0	0	2	466	18	10	8	10	0
August	4	659	26	257	183	18	14	1	2900	116	960	725	0	0	1	353	14	40	17	0	0
September	4	659	26	145	160	12	8	1	3294	131	954	277	0	0	1	245	10	60	35	0	0
October........	2	605	24	271	43	19	13	1	2590	103	937	498	0	0	1	206	8	45	21	10	2
November	2	309	12	356	240	1	6	1	2875	115	865	919	0	0	1	129	5	45	23	13	1
December	2	297	12	241	157	14	17	1	3217	130	905	520	0	0	1	108	6	43	22	12	3
Totals	3	8355	....	2239	1335	14	11	1	31713	...	10880	4924	0	0	1	2479	....	393	424	15	6

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month	Montagu,							Oldham.							Renfrew.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	1	944	38	86	142	16	0	4	856	34	96	127	14	23	2	449	18	76	93	1	0
February	..	1030	41	123	212	5	0	4	1221	50	107	264	17	13	2	344	13	....	....	..	..
March	..	1014	41	171	351	16	0	5	1464	59	83	127	2	7	2	453	18	....	....	..	..
April	2	1167	46	60	148	8	0	3	1146	45	101	79	2	17	2	382	15	....	....	..	..
May	2	955	40	169	396	15	0	3	1226	50	119	111	9	14	2	485	19	56	98	15	0
June	2	2529	101	6	4	10	6	2	1139	45	156	124	9	16	2	393	16	135	165	19	0
July	2	1908	76	229	362	8	0	4	1123	45	100	330	16	17	1	416	16	....	....	..	..
August	1	1766	70	239	593	4	0	4	1130	45	46	298	17	0	1	581	23	....	....	..	..
September ..	1	2344	94	376	1384	5	0	3	1128	45	....	....	..	..	1	689	27	....	....	..	..
October	2	1980	77	459	164	16	5	2	495	18	123	508	0	16	2	493	20	17	3	7	0
November....	2	1725	69	451	135	17	15	2	390	16	123	127	17	2	2	415	16	120	98	0	0
December	2	1545	62	440	104	5	0	2	450	17	116	260	4	0	2	442	17	237	180	8	0
	..	18908	....	2809	4001	6	2	3	11777	....	1170	2360	12	5	2	5542	....	641	639	10	0

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month.	Sherbrooke.							Stormont.							Tangier.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt	Grs.
January	6	1809	72	211	162	2	0	2	792	31	75	175	19	0	2	1476	60	181	107	4	0
February	5	1440	58	171	117	15	0	2	853	34	69	146	6	0	2	1883	75	111	63	0	0
March	5	1430	57	122	88	15	0	1	602	24	50	77	12	0	2	1685	67	140	48	11	2
April	5	1456	58	130	90	10	0	2	622	25	60	89	18	0	2	939	39	13	6	3	0
May	6	1352	54	280	93	9	0	1	495	19	58	68	14	0	2	1120	45	41	17	17	12
June	7	1326	51	185	57	1	0	1	410	16	37	48	2	0	2	1448	59	....	....	..	..
July	10	1350	54	421	101	5	0	2	611	24	72	74	7	0	3	1460	59	....	....	..	..
August	9	910	36	112	30	3	0	1	322	13	58	63	4	0	2	386	15	....	....	..	..
September ..	6	1324	53	229	167	14	0	1	417	17	85	49	6	0	2	360	14	64	20	12	0
October	4	1080	43	136	120	0	0	2	327	13	27	13	5	10	2	1008	40	120	63	8	0
November....	5	1196	47	212	108	0	0	1	284	11	83	39	18	0	2	1053	40	74	63	11	0
December	4	1377	55	217	101	11	0	1	156	9	33	17	4	0	2	911	36	130	41	3	0
Totals	6	16050	....	2426	1238	11	0	1	5891	....	707	863	15	10	2	13729	....	874	431	9	14

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(CONTINUED.)

Month.	Uniacke.							Waverly.							Unproclaimed, Etc.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Oz.	Dwt.	Grs.
January	1	198	8	54	9	15	0	..	....	....	....	....	..	..	8	2668	106	277	435	6	16
February	1	150	6	219	61	13	0	1	20	1	....	....	..	..	7	2465	98	132	71	3	15
March	1	100	4	52	21	3	0	1	60	2	4	6	9	0	9	3284	123	323	278	14	21
April	1	275	11	154	57	16	22	1	76	3	....	....	..	..	2	2166	86	466	259	0	0
May	2	295	12	98	26	19	0	1	68	3	8	6	9	0	4	2468	97	574	324	15	0
June	3	668	26	279	85	7	21	1	214	8	26	19	12	0	5	3068	123	417	356	4	18
July	3	575	23	245	78	0	0	1	148	6	20	19	4	0	7	3661	146	425	975	17	0
August	3	440	18	208	56	19	22	1	115	5	15	13	0	0	7	3830	152	404	783	4	0
September ..	3	552	22	205	65	14	21	1	247	10	109	83	0	6	7	3250	130	171	518	14	0
October	2	431	19	143	17	8	0	1	....	....	....	....	..	..	5	4133	165	369	595	13	4
November ..	3	382	15	179	40	9	7	1	....	....	41	22	8	0	4	3843	153	243	323	0	0
December	3	407	12	174	54	13	15	1	187	7	....	....	..	..	3	3668	143	212	316	3	0
Totals	2	4473	....	2010	576	0	12	1	1135	....	223	170	2	6	5	38504	...	4013	5237	16	2

GOLD.

GENERAL ANNUAL SUMMARY.

Year.	Total ounces of Gold extracted.			Stuff Crushed.	Yield per Ton of 2,000 lbs.			Total Days Labor.	Average earnings per man per day and year, at 300 working days, $18 per oz.	
	Oz.	Dwt.	Gr.	Tons.	Oz.	Dwt.	Gr.		A day.	A year.
1862	7275	0	0	6473	1	2	11	156,000	$ 83	$249
1863	14001	14	17	17002		16	11	273,264	92	276
1864	20022	18	13	21434		18	16	252,720	1 42	426
1865	25454	4	8	24423	1	0	20	212,966	2 15	645
1866	25204	13	2	32161		15	2	211,796	2 14	642
1867	27314	11	11	31386		17	9	218,894	2 24	672
1868	20541	6	10	32262		12	17	241,462	1 53	459
1869	17868	0	19	35147		10	4	210,938	1 52	456
1870	19866	5	5	30829		12	21	173,680	2 05	615
1871	19227	7	4	30791		12	11	162,992	2 12	636
1872	13094	17	6	17093		15	7	112,476	2 09	627
1873	11852	7	19	17708		13	9	93,570	2 28	684
1874	9140	13	9	13844		13	5	77,246	2 12	636
1875	11208	14	19	14810		15	4	91,698	2 20	660
1876	12038	13	18	15490		15	13	111,304	1 94	582
1877	16882	6	1	17369		19	10	123,565	2 46	738
1878	12577	1	22	17990		13	23	110,422	2 05	615
1879	13801	8	10	15936		17	8	92,002	2 34	702
1880	13234	0	4	14037		18	20	103,826	2 18	654
1881	10756	13	2	15556		12	20	126,308	1 52	456
1882	14107	3	20	22081		12	18	106,884	2 37	711
1883	15446	9	23	25954		10	21	97,733	2 84	862
1884	16059	18	17	25147		12	18	118,087	2 40	720
1885	22203	12	20	28890		15	4	157,421	2 53	759
Total.	389180	4	15	524813	....			3,637,614	......	......

INTERCOLONIAL RAILWAY.

Statement showing the quantities, in tons, of the different kinds of Coal received from the various Mines for the use of the Intercolonial Railway, during the year 1885.

Months.	Acadia.	Albion.			Chignecto.	Drummond.	Spring Hill.			Vale.	
		Round.	Small.	Coke.			Run of Mine.	Small.	Round.	Round.	Small.
January		2589	24			21	1421			6761	
February	22	5778	25	9			3089	20	12	2043	
March	43	3802	75		18		2987		11	2424	
April	26	4459	37			16	6107			4347	
May		2525	158				6558			3098	
June		1784		12			9902			5213	
July		89	21						4775	5225	
August			10						6284	3553	
September			114	12					10048	5982	
October			150						7541	6801	
November			15					80	6896	5317	
December				14				57	7755	6470	11
Totals	91	21,026	629	47	18	37	30,064	157	43,322	57,234	11

MONCTON, N. B, *January 28th, 1886.*

INTERCOLONIAL RAILWAY.

STATEMENT, showing the number of tons of Coal received from Mines in Nova Scotia during the year ending the 31st December, 1885.

STATIONS.	No. Tons.	STATIONS.	No. Tons.
Halifax	40232	Moncton	13984
Bedford	454	Salisbury	1445
Windsor Junction	5138	Peticodiac	285
Wellington	98	Penobsquis	1036
Enfield	227	Sussex	558
Elmsdale	200	Apohaqui	18
Milford	77	Norton	28
Shubenacadie	283	Passekeag	14
Stewiacke	553	Hampton	650
Brookfield	89	Rothsay	138
Truro	6879	Coldbrook	4915
Valley	12	St. John	24203
Riversdale	10	Berry's Mills	22
West River	12	Weldford	24
Glengarry	18	Kent Junction	467
Hopewell	1230	Chatham Junction	334
Stellarton	47	Derby	36
New Glasgow	14093	Newcastle	69
Picton Landing	48433	Bathurst	500
Belmont	58	Petite Roche	22
East Mines	72	Jacquet River	16
Londonderry	43275	New Mills	24
Wentworth	30	Charlo	6
Greenville	33	Dalhousie Junction	80
Thomson	18	Campbellton	146
Oxford	406	Little Metis	6
River Philip	6	St. Octave	6
Athol	6	Ste. Flavie	31
Maccan	45	St. Luce	4
Nappan	105	Rimouski	154
Amherst	3359	Trois Pistoles	19
Aulac	255	Riviere du Loup	59
Sackville	1868	St. Paschal	13
Dorchester	945	St. Charles	12
Memramcook	336	St. Henri	5508
Painsec Junction	6	Pointe Levis	15620
Shediac	264	Chaudiere (Local)	76054
Point du Chene	51	" (West of)	68609
			384338

From the following Stations:

STATIONS.	No. Tons.
Drummond	24260
Hopewell	1527
Stellarton	80514
New Glasgow	24960
Spring Hill	248903
Maccan	4174
Total	384338

19363 tons of Coke forwarded from Stellarton to Londonderry.

MONCTON, N. B., *January 28th, 1886.*

MINERALS OTHER THAN THOSE LEASED FROM THE CROWN.

* Gypsum.

Windsor	Tons.	60,628	Value	$60,628
Cheverie	"	20,292	"	15,095
Walton	"	1,717	"	1,324
‡ St. Ann's, C. B.	"	2,790	"	....
Arichat (Lennox Passage)	"	2,000 ?	"	2,000
Halifax	"	217	"	1,839
† Walton	"	1,400	"	910

* Building Stone.

Antigonish	Tons.	36	Value	$ 144
Pictou	"	71	"	213
Wallace	"	3,720	"	17,592
		3,827		$17,949

Grindstones, etc.

Lower Cove, A. Seaman & Co.	Tons.	2,058	Value	$28,812
* Parrsboro	"	150	"	150
		2,208		$28,962

* Manganese.

Tenny Cape, Hants Co.	Tons.	100	Value	$ 1,845
Windsor, "	"	26	"	
Walton, "	"	27½	"	1,810
East Mountain, Colchester Co.	"	120	"	9,000
Loch Lomond, C. B.	"	20	"	
Bridgeville, Pictou Co.	"	60	"	6,600
		353½		

Average number of men employed........................12

* Antimony.

Rawdon	Tons.	758	Value	$33,095

* Amounts exported.
† Barrels ground Plaster.
‡ Tons extracted, 3,000.

IRON MINING.

Londonderry	48,033	tons.
Bridgeville, Pictou Co	83	"
Annapolis	13	"
	48,129	

AVERAGE FORCE EMPLOYED DAILY.

	No. of men.	Days Worked.
Skilled workmen:		
Under ground	79	21,661
Above ground	21	6,210
Unskilled workmen:		
Under ground	28	7,732
Above ground	69	18,516
Total	197	54,119

LIMESTONE (*Partial.*)

Pugwash	Tons.	215
St. Peter's	"	500
Londonderry (ankerite)	"	2,335
Brookfield*	"	13,379

BARYTES.

Henderson & Potts, Brookfield.	Tons.	300
Average force employed daily		3

* About 50,000 barrels of lime were burned in P. E. Island for agricultural purposes from Nova Scotia limestone.

EXPORTS FROM HALIFAX.

Products of the Mine year ending December 31st, 1885.

		Produce of Canada.		Not Produce of Canada.	
Coal	Tons.	22,713	$ 72,532		
Gold		....	397,902		
Gold Quartz		....	150		
Gypsum	Tons.	217	1,839		
Oils, Mineral	Gals.	1,485	486	1,396	$ 170
Antimony	Tons.	758	33,095		
Manganese	Tons.	22	1,399		
Salt	Bush.	....	....	29,652	6,129
			$507,403		$6,299

FINANCIAL STATEMENT.—GOLD, &c.

Mines Department for twelve months ended 31st December, 1885.

DISTRICTS.	Receipts.			Expenditure.				
	Rents.	Royalty.	Total.	Return Rents.	Return Royalty.	Royalty Commission.	Salaries and Surveys.	Total.
Caribou	$114 00	$ 281 59	$ 395 59	.....	....	$ 9 68	....	$ 9 68
Darr's Hill	....	1473 12	1473 12	.....	....	....	....	....
Fifteen Mile Stream	372 00	....	372 00	.....	....	....	....	....
Gay's River	2 00	....	2 00	.....	....	....	....	....
Lawrencetown	24 00	....	24 00	.....	....	....	$ 11 60	11 60
Montague	178 00	1416 72	1594 72	.....	....	78 88	10 00	88 88
Oldham	220 00	795 68	1015 68	.....	....	31 17	40 00	71 17
Ovens	18 00	2 25	20 25	$ 2 00	....	....	....	2 00
Renfrew	52 00	209 90	261 90	.....	....	10 51	32 00	42 51
Sherbrooke	278 00	471 91	749 91	32 00	....	24 03	400 80	456 83
Stormont	612 00	362 47	974 47	.....	....	10 98	37 00	47 98
Tangier	16 00	302 92	318 92	.....	....	12 76	....	12 76
Uniacke	....	70 69	70 69	.....	....	12 56	130 00	142 56
Waverly	244 00	36 35	280 35	.....	$ 19 64	90	....	20 54
Wine Harbor	162 00	35 37	197 37	.....	....	1 77	....	1 77
Unproclaimed	1362 00	1624 14	2986 14	24 00	184 84	63 48	315 57	587 89
Prospecting Licenses	....	....	4459 01	.....	....	....	....	262 41*
	$3654 00	$7083 11	$15196 12	$58 00	$204 48	$256 72	$ 976 97	$1758 58

*Return.

OTHER THAN GOLD.

Mines Department for twelve months ended 31st December, 1885.

COUNTIES.	Receipts.				Expenditures.		
	Licenses to Search.	Licenses to Work.	Royalty.	Totals.	Ret'rn Licenses to Search.	Salaries and Surveys.	Totals.
Annapolis	$ 20 00			$ 20 00			
Antigonish	120 00	$ 50 00		170 00			
Cape Breton	240 00	350 00	$ 42118 42	42708 42		$ 946 70	$ 946 70
Colchester	140 00			140 00			
Cumberland	240 00	250 00	26147 79	26637 79		720 00	720 00
Digby	40 00			40 00			
Guysborough	60 00			60 00			
Halifax	20 00			20 00			
Hants	120 00			120 00			
Inverness	200 00	25 00	9 70	234 70			
Kings							
Pictou	560 00		33135 34	33695 34	$20 00	472 00	492 00
Richmond		50 00		50 00	20 00		20 00
Victoria	40 00	25 00		65 00			
Yarmouth	20 00			20 00			
Examinations				52 00			217 92
Fines							36 67
	$1820 00	$750 00	$ 101,411 25	$ 104,033 25	$40 00	$2138 70	$2433 29

ABSTRACT ACCOUNT.

Receipts and Expenditure for the twelve months ended 31st December, 1885.

RECEIPTS.			EXPENDITURE.		
Licenses to Search	$ 182,000 00		Return Licenses to Search	$ 40 00	
" Work	750 00		Salaries and Surveys	2138 70	
Royalty	101,411 25		Fines	36 67	
Examinations	52 00		Examinations	217 92	
		$104,033 25			$ 2433 29
Rents	$ 3654 00		Return Rents	$ 58 00	
Royalty	7083 11		" Royalty	204 48	
Prospecting Licenses	14459 01		Royalty Commission	256 72	
		$ 15196 12	Salaries and Surveys	976 97	
			Return Prospecting Licenses	262 41	
					$ 1758 58
			General Expenses	$4906 08	
			Postage	131 00	
			Stationery and Printing	930 18	
					$ 5967 26
		$ 119,229 37			$10159 13